DOCUMENT RESUME

ED 387 352 SE 056 818

AUTHOR Schoon, Kenneth J., Ed.; Wiles, Clyde A., Ed.
TITLE Curriculum Designs for Tech Prep Clusters. PACE '94.
INSTITUTION Gary Community School Corp., IN.; Indiana State Commission for Higher Education, Indianapolis.; Indiana Univ. Northwest, Gary.; Merrillville Community School Corp., IN.
SPONS AGENCY Eisenhower Program for Mathematics and Science Education (ED), Washington, DC.
PUB DATE 94
NOTE 73p.; For related documents, see SE 056 817-820.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Course Descriptions; *Curriculum Design; High Schools; *Mathematics Curriculum; Mathematics Education; *Science Curriculum; Science Education; *Technology Education; *Tech Prep

ABSTRACT

This booklet contains descriptions of various Tech Prep programs developed by PACE (Promoting Academic Excellence In Mathematics, Science & Technology for Workers of the 21st Century). Each entry includes general program descriptions, curriculum outlines, and course descriptions. The clusters and their specialty areas described in the booklet are: Emerson School for the Visual and Performing Arts (management, marketing, entrepreneurship, and fine arts; health, human services, and fine arts), Horace Mann High School (health related areas), Lew Wallace High School (information management systems technology; business, management, and marketing; and building trades), Merrillville High School (business, marketing, health, human services, and manufacturing), Rooseveit High School (manufacturing, engineering technology, health and human services, residential and commercial construction, and marketing and merchandising technology), West Side High School (industrial technology, pre-engineering, and business), and William A. Wirt and Andrean High Schools (business, health, and manufacturing and engineering technology). (MKR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 387 352

PACE '94

Curriculum Designs for Tech Prep Clusters

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Kenneth J. Schoon
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Kenneth J. Schoon • Clyde A. Wiles
Editors

PACE **Promoting Academic Excellence In Mathematics, Science & Technology for Workers of the 21st Century.**

Gary Community School Corporation
Merrillville Community School Corporation
Indiana University Northwest

BEST COPY AVAILABLE

SE056818

Table of Contents

Emerson School for the Visual and Performing Arts 1
Management, Marketing, Entrepreneurship and Fine Arts
Health, Human Services and Fine Arts

Horace Mann High School 9
Health Related Areas

Lew Wallace High School 13
Information Management Systems Technology
Business, Management and Marketing
Building Trades

Merrillville High School 27
Business, Marketing
Health, Human Services
Manufacturing

Roosevelt High School 39
Manufacturing, Engineering Technology
Health and Human Services
Residential and Commercial Construction
Marketing and Merchandising Technology

West Side High School 49
Industrial Technology and Pre-Engineering
Business

William A. Wirt and **Andrean High Schools** 59
Business
Health
Manufacturing and Engineering Technology

Emerson School for the Visual and Performing Arts

Tech Prep Clusters:

MANAGEMENT, MARKETING, ENTREPRENEURSHIP and FINE ARTS

HEALTH, HUMAN SERVICES and FINE ARTS

Sadie Daniels, Cheryl Johnson, Mary Sherman

Emerson V.P.A. Tech Prep Clusters

Management, Marketing, Entrepreneurship, and Fine Arts Cluster

Health, Human Services and Fine Arts Cluster

Group Members: Sadie Daniels, Cheryl Johnson, Mary Sherman

The two clusters that were selected for Emerson School will enable a student to go directly into an entry level job upon completion of high school.

The **Management, Marketing, Entrepreneurship, and Fine Arts Cluster** may lead to entry-level jobs in the areas of: Accounting, secretarial services, instrument/music entrepreneur, private music tutor, instrument repair, production of instruments and Instrument cases. The **Health, Human Services and Fine Arts Cluster** may lead to entry-level jobs in the areas of physical therapist, nuclear medicine, dietitian, nurses' aide or product tester.

Students will have a wide variety of career selections along with different learning modalities that will be incorporated.

All Math competencies for the Gateway exam will be covered before 10th grade. By grade 12, Math competencies should be mastered. Indiana Core 40 competencies in mathematics will be fully met only in the Health and Human Services Cluster.

The sequence of courses takes into account students' ability levels, which should enable the successful completion of the program. Long-term growth will depend upon the involvement of administrators, counselors, staff, parents, and partnerships as well as teacher planning and implementation, staff development, motivation, enthusiasm and marketing strategies.

Curriculum Outlines

Management, Marketing, Entrepreneurship, and Fine Arts Cluster

8th Grade
Algebra I - College Prep
Math 8
Science/Health
Language Arts (Student Success Skills)
Social Studies (Career Awareness)
P.E.
Fine Arts Elective

9th Grade
Algebra I TP or Pre-Algebra TP
Biology TP
Keyboarding I/Computer Applications
English I
P.E.
Fine Arts Elective

10th Grade
Investigative Geometry TP or Algebra I TP
Physical Science TP
Accounting I
English II
African American History/Speech
Fine Arts Elective

11th Grade
Trigonometry, Probabilities and Data Analysis TP
or Investigative Geometry TP
Accounting II
Business Law/Health and Safety
English III
U.S. History
Fine Arts Elective

12th Grade
Algebra II TP or Trig, Prob and Data Analysis TP
Business Management/Computerized Accounting
Advanced Computer Applications/Entrepreneurship
English IV
Applied Economics/Government
Fine Arts Elective

HEALTH, HUMAN SERVICES and FINE ARTS CLUSTER

8th Grade
Algebra I - College Prep
Math 8
Science/Health
Language Arts (Student Success Skills)
Social Studies (Career Awareness)
P.E.
Fine Arts Elective

9th Grade
Algebra I TP or Pre Algebra TP
Biology TP
Keyboarding I/Computer Applications
English I
P.E.
Fine Arts Elective

10th Grade
Investigative Geometry TP or Algebra I TP
Physical Science TP
Accounting I
English II
African American History/Speech
Fine Arts Elective

11th Grade
Trigonometry, Probabilities and Data Analysis TP
or Investigative Geometry TP
Chemistry Med
Career in Health Technologies/Health and Safety
English III
U.S. History
Fine Arts Elective

12th Grade
Algebra II TP or Trig, Prob and Data Analysis TP
Chemistry of the Community TP
Human Physiology TP
English IV
Applied Economics/Government
Fine Arts Elective

Course Descriptions

PRE-ALGEBRA Grade 9

Course Description: Pre-Algebra is a full-year course which provides the incoming mathematical background, skills, and thinking processes necessary for the successful completion of Algebra I. Topics include whole numbers, integers, rationals, decimals and their applications, number theory, ratio, proportion, percent, equations, graphing, square roots, and appropriate geometric concepts. The instructional program of this course should provide for the understanding and use of these concepts as well as their application through appropriate problem-solving situations.

A. Prerequisites: Complete 8th grade mathematics course

B. Competencies: Upon completion of this course the student will be able to
1. Demonstrate an understanding of place-value, powers, square roots, and rational approximations of irrational numbers.
2. Perform rounding and use various estimation techniques.
3. Perform the operations on whole numbers, fractions, decimals, integers, and rational numbers.
4. Show the relationship between fractions, decimals, and percent, and convert them to equivalent fractions.
5. Recognize number patterns and use fundamental concepts of number theory.
6. Solve problems involving discount, tax, interest, markup, and/or statistics using the concept of percent.
7. Use a straightedge, protractor, compass, or a reflective device to draw and measure angles and make geometric constructions.
8. Estimate and measure using standard and nonstandard units relating to length, area, mass, and volume.

9. Select and use appropriate instruments and units for estimating, measuring, and computing length, area, volume, capacity, mass, weight, and temperature.
10. Use and convert within the customary (standard) units of measurement.
11. Use and convert within the metric units of measurement.
12. Describe basic geometric terms.
13. Identify angles, polygons, and the edges, faces, vertices, and diagonals of geometric figures.
14. Solve problems involving perimeter, circumference, area, volume, and surface area of geometric figures using both manipulatives and formulas.
15. Identify lines of symmetry, similar figures, and congruent figures.
16. Demonstrate skills in mental computation, estimation, and visual imaging.
17. Use ratios and proportions as they apply to similar figures, scale drawings, and problem-solving.
18. Apply the concept of proportion to solving real-life situations.
19. Determine the various measures of central tendency (mean, median, mode) given a set of data.
20. Analyze and solve probability problems, and predict outcomes for multiple events.
21. Evaluate algebraic expressions.
22. Solve equations and inequalities.
23. Graph equations and inequalities on the number line and the Cartesian plane (x/y axis).
24. Plot points, graph equations and inequalities on the Cartesian plane.
25. Write number sentences to aid in problem-solving, find the solution sets, and check for reasonableness of results.
26. Determine function rules.
27. Apply mathematical skills to problem-solving activities involving both routine and nonroutine problems.
28. Use a calculator and computer to solve problems and to explore and investigate patterns and relationships.

C. Method/Approach:
1. Hands-on experiences
2. Applications based
3. Competency based
4. Cooperative learning
5. Use instructional strategies to encompass different learning styles (4-MAT)
6. Integrate with English, science, and business courses
7. Use appropriate technology (calculators, computers, video, etc.)
8. Topics taught sequentially
9. Use multiple assessment procedures
10. Use higher order thinking skills

D. Specific Problems/Situations:
1. Use logical reasoning and guess and check in problem-solving situations.
2. Solve problems using strategies such as making a list, drawing a picture, and looking for a pattern.
3. Given a problem-solving situation, identify one or more strategies for solving it.
4. Make and validate conjectures.
5. Explain the thought process in writing or orally when given a problem-solving situation.
6. Investigate the role of mathematics in our society.
7. Identify mathematical concepts needed for each cluster.
8. Provide opportunities for remediation and enrichment.

ALGEBRA ONE Grade 9

Course Description: Algebra One is a full year course which provides a formal development of the algebraic skills and concepts necessary for students to take a geometry course and other advanced college-preparatory courses. In particular, the instructional program in this course provide for the use of algebraic skills in a wide range of problem-solving situations.

The concept of function should be emphasized throughout the course. Topics should include properties of real numbers, solution and evaluation of equalities and inequalities, graphing of linear equations and solution sets, basic operations with polynomials, solving quadratic equations and systems of equations, use of exponents, and introductory topics from Statistics and Probability. Problem-solving and reasoning skills are emphasized with each topic.

A. Prerequisites: Complete 8th grade mathematics course or Pre-Algebra

B. Competencies: Students will maintain the skills taught at the previous grade levels through continuous review. Upon completion of this course the student will be able to

1. Define the opposite of an integer and absolute value in terms of distance on a number line.
2. Add, subtract, multiply, and divide positive and negative integers.
3. Add positive and negative integers by using a model such as money, a number line, or chips.
4. Evaluate algebraic expressions by observing the order of operations.
5. Use the distributive property to simplify algebraic expressions.
6. Rewrite a simple phrase or expression in mathematical terms.
7. Translate word sentences into equations.
8. Find solutions to algebraic equations of the form AX + B = C when A, B, and C are integers.
9. Determine whether or not a value is a solution of a given problem.
10. Solve a literal equation for a specified variable.
11. Add and subtract polynomials.
12. Find the product of two binomials.
13. Factor the difference of two perfect squares.
14. Factor trinomials of the type: AX^2 + BX + C when A = 1.
15. Simplify an expression involving a whole number base and a whole number exponent.
16. Write any whole number in scientific notation.
17. Simplify a numerical expression written in scientific notation when exponents are positive.
18. Write the meaning of a whole number or variable which is raised to the zero power or to a negative integral power.
19. Locate points in all four quadrants of the Cartesian plane.
20. Graph lines of the type Y = MX when M represents a whole number.

C. Method/Approach:

1. Hands-on experiences
2. Applications based
3. Competency based
4. Cooperative learning
5. Use instructional strategies to encompass different learning styles (4-MAT)
6. Integrate with English, science, and business courses.
7. Use appropriate technology (calculators, computers, video, etc.)
8. Topics taught sequentially
9. Use multiple assessment procedures
10. Use higher order thinking skills

D. Specific Problems/Situations:

1. Use logical reasoning and guess and check in problem-solving situations.
2. Solve problems using strategies such as making a list, drawing a picture, and looking for a pattern.

3. Given a problem-solving situation, identify one or more strategies for solving the problem.
4. Make and validate conjectures.
5. Explain the thought process in writing or orally when given a problem-solving situation.
6. Investigate the role of mathematics in our society.
7. Identify mathematical concepts needed for each cluster.
8. Provide opportunities for remediation and enrichment.

INVESTIGATIVE GEOMETRY Grade 10

Course Description: This course is a study of geometric concepts and applications. Emphasis is on an investigative study of basic properties of lines, angles, triangles, polygons, and circles as well as spatial relationships, inductive reasoning, logical thinking, and a variety of forms of proof. Drawing and interpreting planar and spatial phenomena, transformations, and geometric problem-solving are also included.

A. Prerequisites: Algebra One (Two semesters)

B. Competencies: The students will maintain the skills taught at the previous grade levels through continuous review. Upon completion of this course the student will be able to
   1. Name planes and other basic figures.
   2. Use correct symbols for naming segments and their lengths, lines, rays, angles and their measures, and congruency.
   3. Find the distance between two points on a number line.
   4. Explain and find the midpoint of a segment.
   5. Explain and find the perpendicular bisector of a segment.
   6. Explain and find the bisector of an angle.
   7. Use "if - then" statements and their converses.
   8. Recognize and apply theorems concerning complementary, supplementary, and vertical angles.
   9. Name and apply the definitions for the angles formed by parallel lines cut by a transversal.
   10. Classify triangles according to the measure of their sides and angles.
   11. Name congruent triangles and their corresponding congruent parts.
   12. Identify and apply the properties for the altitudes and medians of triangles.
   13. State and apply the triangle sum theorem.
   14. Find the interior angle sums of convex polygons.
   15. Find the exterior angle sums of convex polygons.
   16. Identify and apply the properties for certain quadrilaterals such as the parallelogram, rectangle, square, and trapezoid.
   17. Calculate the area of a circle, square, rectangle, and triangle.
   18. Describe a circle and the related line segments and lines to a circle.
   19. Estimate various metric and standard measurements by using reference objects from the real world.
   20. Classify and find the various arcs of a circle.
   21. Identify and find the measure of a central angle and inscribed angle.

C. Method/Approach:
   1. Hands-on experiences
   2. Applications based
   3. Competency based
   4. Cooperative learning
   5. Use instructional strategies to encompass different learning styles (4-MAT)
   6. Integrate with English, Science, and Business Courses.
   7. Use appropriate technology (calculators, computers, video, etc.)

8. Topics taught sequentially
9. Use multiple assessment procedures
10. Use higher order thinking skills

D. Specific Problems/Situations:
1. Use logical reasoning and guess and check in problem-solving situations.
2. Solve problems using strategies such as making a list, drawing a picture, and looking for a pattern.
3. Given a problem-solving situation identify one or more strategies for solving the problem.
4. Make and validate conjectures.
5. Explain the thought process in writing or orally when given a problem-solving situation.
6. Investigate the role of mathematics in our society.
7. Identify mathematical concepts needed for each cluster.
8. Provide opportunities for remediation and enrichment.

SCIENCE/HEALTH Grade 8

Course Description: This course will consist of general concepts of physics, chemistry, biology, nutrition, careers in science/health and contributors in the science/health fields. Social skills for cooperative learning will be included.

A. Prerequisites: The students must be able to
1. Practice safety when handling science equipment and chemicals.
2. Measure and convert SI units of length, volume, mass, and temperature.
3. Collect, interpret and display data in graphs.
4. Write simple balanced chemical equations using symbols, words,, and formulas.
5. Perform simple experiments demonstrating physical and chemical changes.
6. Identify various sources of energy and give advantages and disadvantages of each.
7. Calculate average acceleration and deceleration.
8. Demonstrate inertia and centripetal force.
9. Calculate how mass and velocity affect momentum.
10. Use plate tectonics to explain earthquakes, volcanic activity, and mountain formations.
11. Describe changes in weather and major factors that affect climate of a region.
12. Label and compare the circulatory, respiratory, digestive, reproductive, and external features.
13. Describe succession in a community.
14. Explain the difference between a symbiotic and parasitic relationship.
15. Investigate ways to conserve resources including recycling.
16. Research and identify key persons and their contributions to the development of science.

B. Competencies: The students will be able to
1. Name the different types of sciences and list careers in each.
2. Demonstrate appropriate social skills for constructive group learning.
3. Identify common measurement apparatus used in the laboratory.
4. Write a well balanced diet and calculate the number of calories in each dish.
5. Draw conclusions from scientific information read in a group.
6. Demonstrate the scientific method to design and conduct experiments which have a control and one variable.
7. Explain the effects of technology on the environment.
8. Use the microscope to observe and compare various cells.
9. Demonstrate how loss or gain of heat energy affects solids, liquids, and gases.
10. Demonstrate how sound is produced.
11. Differentiate wave types on the electromagnetic spectrum.

12. Demonstrate attraction and repulsion between a magnet's poles, and use iron filings to show the magnetic field of a magnet.
13. Differentiate between static and current electricity.
14. Differentiate between refraction and reflection.
15. Contrast a concave mirror with a convex mirror.
16. Interpret data in the periodic table and give examples of the chemical behavior of the elements.

C. Method/Approach:
1. Incorporate all learning styles in planning and teaching.
2. Use hands-on experiences.
3. Simulate workplace.
4. Use cooperative learning groups.
5. Invite guest speakers.
6. Use multi-media approach.
7. Field trips.
8. Guest professor from local universities assist.

D. Specific Problems/Situations
1. Visit business sites.
2. Invite professors from local universities to provide laboratory experiences for students.
3. Participate in Science Fairs: School, city-wide, and regional.

BIOLOGY TP 1, 2 Grade 9

Course Description: This course will consist of the study of all living things, equipment used in the laboratory and on site visits at local health facilities.

A. Prerequisites: The students will master competencies for Science/Health 8

B. Competencies: The students will be able to
1. Investigate major categories of disease to find out what causes them and how they can affect our health.
2. Research employment opportunities in health care related to major categories of disease.
3. Describe the major pathogens that invade the human body.
4. Explore the link between American lifestyles (nutrition, work, exercise, and play) and major health threats.
5. Relate environmental hazards and workplace conditions to specific health diseases.
6. Predict the effects of abusing specific substances on the body and mental state of the user.
7. Discuss various treatments to cure addictive diseases.
8. Distinguish the differences among various diets/ration regimens (high protein, low carbohydrate, antibiotic-supplemented feeds).
9. Evaluate diets to determine the balance of caloric intake and average caloric usage, and predict the effect that such a diet might have on body weight.
10. Determine the presence of selected nutrients in sample meals developed by dietitians, based on laboratory tests of the meals nutrients content.

C. Method/Approach:
1. Workplace simulation
2. Workplace visits
3. Cooperative learning groups
4. Incorporate all learning styles
5. Hands-on experiences
6. Guest lecturers in health fields
7. Use relevance to real-life world

D. Specific Problems/Situations:
1. Students visit worksites
2. Health employees visit class and carry out laboratory experiences with students.
3. Students become Candy Stripers or volunteer workers at local health facilities.

PHYSICAL SCIENCE Grade 10

Course Description: This course include Physics and Chemistry and how both sciences fit into the workplace.

A. Prerequisites: Complete Biology TP 1, 2 and Algebra

B. Competencies: The students will be able to
1. List at least three reasons for using the metric system.
2. Determine the dimensions, mass, and weight of objects (all metric measurements) within the acceptable error limits of the apparatus.
3. Select the controls and variables for an experiment, interpret data, and draw conclusions.
4. Identify composition, changes and properties of matter.
5. Identify structure of atoms and molecules.
6. Test household substances for acids and bases.
7. Investigate Vitamin C concentrations in food.
8. Calculate the work, power, mechanical advantage, and efficiency of a simple machine.
9. Describe how sounds are made in musical instruments.
10. Discuss the nature of light.
11. Construct and explain series and parallel circuits.
12. Use job-related measuring machines with hands-on experience.
13. Contact local businesses using various means (telephone, letter, personal visit, etc.).
14. Choose household cleaning products.
15. Develop methods of testing products for bacteria or other pathogens.

C. Method/Approach
1. Group discussion and debating
2. Workplace simulation
3. Personal interviews with local businesses
4. Multimedia approach
5. Hands-on experiences
6. Cooperative learning groups

D. Specific Problems/Situations
1. Class testing of household products for a local company.
2. Visit electronic department of Ford Motor Company and local steel mills.

Horace Mann High School

Tech Prep Cluster:

Health Related Areas

Reaner Boleware, Rachel Cooper, Jackie Gates,
Barbara Hilton, Willye Cooper-Martin, Joshua Trass,
Charles Ward, and Joyce Williams

Horace Mann High School Tech Prep Clusters

Group Members: Reaner Boleware, Rachel Cooper, Jackie Gates, Barbara Hilton, Willye Cooper-Martin, Joshua Trass, Charles Ward, and Joyce Williams

Why Tech Prep?

Tech Prep is the new state-adopted program which calls for an extensive use of technology in the classroom setting. This program involves making math and science more relevant to the student, by showing how skills learned may be used in the workplace. This entails teaching strategies which include problem-solving techniques through hands-on and activity-centered environments.

This means there is a need for technology in all classrooms. Tech Prep as well as the academic and special needs students should have some awareness of the use of technology as it relates to all disciplines. In addition there will be a need for the classroom teacher to be inserviced on the technology targeted for this project.

In an era of increasingly pervasive technology, our main objective is to ensure our students have the skills and knowledge to compete in a global society. We feel the math and science courses included in our cluster "Health Related Areas" will adequately prepare students for the various careers chosen in this field.

The cluster enables students to find employment directly from high school by providing:

- on the job training,
- mentoring and shadowing relationships, and
- experience gained during internships.

Students should be able to move either into a two-year associates program or a four-year bachelor's degree program because the curriculum meets all requirements for college admission. In addition, it provides experience in a career. The move could be enhanced through the use of articulation agreements with universities.

The competencies required for mastery of the curriculum for the Health Related Area cluster are broad enough to encompass reasonable differences students may have. The science and math competencies included in this curriculum are compatible with the Essential Skills on which the Gateway is based. The Indiana Core 40 competencies will also be compatible with those essential skills identified by the Indiana Department of Education.

The success of this cluster can be verified by comparing yearly results of the Gateway tests administered and by administering student pre and post surveys of their views on the relevancy of these years' learning in science and math in Tech Prep and college prep programs.

Growth in numbers and achievement over time can be determined by comparing the growth of the students enrolled in Tech Prep the first five years and by keeping a record of the achievements of students enrolled in Tech Prep curriculum as compared to the achievement of students in the college prep curriculum over a period of 5 or more years.

Curriculum Outline

Eighth Grade Students must show mastery in eighth grade science and math courses with a GPA of 2.0 or better. In science, they must exhibit scientific process skills, basic laboratory techniques, the ability to select appropriate lab apparatus for a given task and familiarity with the metric system.

In math, they must exhibit 65% mastery on the ISTEP math computations, basic operations using whole numbers, decimals and fractions.

Ninth Grade:	
Core 40 Units	Math and Science Curriculum
2 Math	Algebra I (T) (1,2) or Algebra I
2 Science	Biology (T) (1,2)
2 English	English (1,2)
1 Physical Ed.	Physical Education (1,2)
1 Foreign Lang.	Foreign Language or Elective (1,2)
or 1 Elective	Comp. Application. / Key Boarding. (1,2)
1 World Geography	World Geography (1)
1 Student Success Skills	Student Success Skills (1)
Tenth Grade:	
2 Math	Geometry (T) or Algebra I (T) (1,2)
2 Science	Chemistry (T) or Chemistry (1,2)
2 English	English (3,4)
1 Health and Safety	Health and Safety (1) + Elective
1 Social Studies	African American Studies (1)
1 Speech	Speech (1)
2 Electives	Introduction to Health Careers (1,2) or Electives
Eleventh Grade:	
2 Math	Algebra II or Statistics and Probability (1,2)
2 Science	Physics / Chemistry II (T)
2 English	English III / Applied Communication
2 Social Studies	US History (1,2)
2 Electives	Electives / Health Careers I and II
2 Electives	Anatomy and Physiology (1,2) or Electives
Twelfth Grade:	
2 Electives	Trigonometry or Electives (1,2)
2 English	English IV / Technical Writing (1,2)
2 Electives	Biology II / Chemistry II or Electives
2 Social Studies	US Government / Economics (1,2)
4 Electives	Health Careers III and IV

Course Descriptions

ALGEBRA I (T)

Focuses on math operations, problem-solving techniques, estimation of answers, measurement skills, geometry, simple statistics, and use of algebraic formulas. This course is beneficial for students who learn math in an applied setting and for those heading for vocational-technical careers.

BIOLOGY I (T)

This course will present the scientific fundamentals of biology and chemistry that provide a foundation for careers. The program integrates the biological and chemical aspects of science as a unified domain and employs student activities that relate to work and other life experiences. Student activities explore science in the context of occupational issues, societal concerns, and personal needs.

B. Goals and Objectives

Students will be proficient in

Math:
1. the use of a scientific calculator.
2. basic operations using whole numbers, decimals, and fractions.
3. basic operations using variables.
4. the use of measuring tools.
5. the use of estimation.
6. group learning and sharing of ideas.
7. planning strategies to solve problems.
8. the use of formulas.

Science:
1. use of the scientific method in problem solving.
2. the collection, analysis, and interpretation of data.
3. the use of laboratory equipment and apparatus.
4. the integration of chemical and biological knowledge in regard to the health area.
5. working cooperatively in groups.

C. Method/Approach:

1. Cooperative learning
2. Hands-on experiences
3. Lecture
4. Problem solving
5. Guest speaker / Career awareness
6. Independent research / Course interactions
7. Educational field trips
8. Audio visuals (computers, videos, films, etc.)
9. Practical applications

D. Specific Problems

Math:
1. A dietary technician calculates the broccoli order for two meals for fifty patients
2. A pharmacy technician determines the number of pills required to fill a prescription for one week
3. A dietary technician determines the weight of a food portion for a diabetic

Science:
1. What effect do micro-organisms have on our environment (pro and cons)?
2. How do cells grow and reproduce?
3. What effect does biotechnology have on life as we know it?
4. What helps us to stay healthy?

Lew Wallace High School

Tech Prep Clusters:

INFORMATION MANAGEMENT SYSTEMS TECHNOLOGY

BUSINESS, MANAGEMENT, AND MARKETING

BUILDING TRADES

Marilyn Bielefeld, Lydia Colaire, Mike Commons,
Linda Davis, Yolanda Hall, Jerry Herochik,
James W. Mc. Clain, Kathleen McCoy, and Thomas Powell

Lew Wallace High School Tech Prep Clusters

Group members: Marilyn Bielefeld, Lydia Colaire, Mike Commons, Linda Davis, Yolanda Hall, Jerry Herochik, James W. McClain, Kathleen McCoy, and Thomas Powell.

Lew Wallace Clusters: **INFORMATION MANAGEMENT SYSTEMS TECHNOLOGY**
BUSINESS, MANAGEMENT, and MARKETING
BUILDING TRADES

Lew Wallace Clusters enable students to go to work right out of high school. Since the school has an apprenticeship program with USX, and a Job Shadowing program with Gainer Bank, students will be able to conduct everyday business right out of high school. Also, for entry level positions, students would be well prepared.

Classes taken will provide students with necessary skills for success in technical and college prep programs. The required courses for college admission are offered in the Tech Prep program and the students will have the mobility to move in and out of one program or another.

Diverse learning methods, different learning styles are addressed, presented in a problem-solving format, etc. We will use hands-on activities, and address all learning styles. Also, there will be remediation for students who do not meet with success the first time. Mastery learning is incorporated in the program, the three week module program is designed for that purpose. The remediation program will allow students the opportunity to be retaught the skills that they missed. Also each cluster has levels of overlap that satisfy the skills required for the varying clusters.

The Lew Wallace Tech Prep program incorporates all the core 40 components.

Success of cluster programs can be shown by research in regards to the present program and its graduates' graduation rate and success in post-secondary schools. Our exit exam will also check progress. If the program is successful, the failure rate will decrease, graduation rate rise, the number of students in the program will increase, community and parental support will increase. A comparison of student records will be made at the end of each year, plotting participation and grades over time.

CURRICULUM OUTLINE

EIGHTH GRADE PREREQUISITES

A
1. no more than 10 days absence each quarter, is an acceptable attendance for Tech Prep.
2. teacher recommendation from eighth grade.
3. graduated from eighth grade.
4. passed gateway test
5. aptitude test, baseline test
6. student desire to do Tech Prep.

The student should be able to

1. review computational and estimation skills for whole numbers, fractions, and decimals.
2. solve simple one-step algebraic equations by undoing the indicated operations
3. interpret the order symbols, <, = and >.
4. evaluate the value of a formula by substituting given values of the variables.
5. simplify a numerical expression involving whole numbers by observing the order of operations.
6. simplify expressions involving integer based and positive exponents.
7. write standard numerals in scientific notation and vice versa.
8. solve word problems using rational numbers.
9. write fractions as decimals rounded to the nearest hundredth.

10. identify a reference object to represent each of the most commonly used metric units of length, capacity, and mass.
11. convert commonly used metric units of length, mass, and capacity to other metric units using decimal relationships.
12. find 100%, 50%,10%,and 1% of any whole number by inspection.
13. find percents of numbers.
14. find what percent one number is of another number.
15. find the total number when a percent of the number is known.
16. find discounts and sale prices.
17. find unit prices.
18. make change from any denomination of money.
19. multiply powers of ten by adding exponents and divide powers of ten by subtracting exponents.
20. add, subtract and multiply both integers and rationals, and divide one rational by another.
21. identify irrational numbers.
22. recognize congruent angles or similar figures from drawings.
23. use formulas for perimeters of polygons, circumferences of circles and areas of both.
24. bisect angles and lines with construction techniques.
25. organize simple data.
26. find means, modes, medians and ranges for sets of data.
27. find probabilities that given events will occur.
28. use formulas to find areas of rectangles, triangles, parallelograms and a trapezoids.
29. explain the differences between volume and area and find volumes/surface areas of prisms, cylinders, cones and pyramids using formulas.
30. solve one and two step equations.
31. graph points, equations, or inequalities with one variable.
32. graph solutions of combined inequalities.
33. use calculators efficiently to perform basic operations.
34. use rounding to estimate answers to problems involving the basic operations.
35. interpret graphs.

B. Competencies are attached. The students will be able to do these as adapted from the Essential Skills 1992-93. Mathematics Grade 7-12 for Algebra 1 and 2, Geometry, Trigonometry, and Calculus.

C. Method/Approach
   1. The use of Mastery Learning whereby every three weeks, a modular test will be given to test appropriate competency
   2. Cooperative learning to facilitate the different types of clusters/careers
   3. Laboratories, indoors and outdoors, whereby students will be involved in gathering information and doing assessments
   4. Utilize thematic instruction whereby each week the lesson will be set up in themes and each group of two to four students will be responsible for presenting a component of the theme. This encourages writing and communications/presentations skills across the curriculum.
   5. Use of audio visual, tape recorders, and cassettes, camcorders, television and VCR, and overhead projectors in the lesson presentations
   6. Computer assisted tutorials.
   7. Independent study.

D. Problems relating to Business and Marketing, Industrial Technology, Information Systems technology will be included in instruction. Examples are:

Business and Marketing: If the manager of a carnival raises his admission $2.00 he may lose 10 people, however he will decrease his overhead by $500.00. If his present admission averages 1000 people what should he do and why? Give your reasons.

Industrial Technology: Bobby is building a dog pen using 100 yards of fencing. Give the measurement of the rectangular pen that has the greatest area.

Information Systems: Sam is producing a wedding video for Lydia and her husband. They have allotted $150.00 for this project. If the video rental is $50.00 plus $15.00 / hour of operation. How many hours can Sam allow the couple without going over budget.

Special Notes:- these are the apprenticeship partners that Lew Wallace has so far

USX- for Applied Physics
BANK ONE- for General Math or Algebra I
BUILDING TRADE- for Algebra I or Geometry
MECCA- for Business
Purdue or Ivy Tech - 2 year degrees
Local unions in building trades

Curriculum Outlines

INFORMATION MANAGEMENT SYSTEMS TECHNOLOGY

YEAR 9

English 9
Algebra 1 or Algebra A
Biology or Biology A
Physical Education
Introduction to Business
General Elective

YEAR 10

English 10
Algebra B or Algebra I or Geometry or Applied Geometry
Biology B or Applied Physics or Physical Science
Health/Safety and Speech
African-American History and Geography
General Elective

YEAR 11

English II
Algebra II or Applied Geometry or General Math II
U.S. History-20th Century
Cluster elective
Accounting I
General elective

YEAR 12

Business English and Applied Communication
U.S. Government and Consumer Economics
Data Analysis/Probability and Cluster Elective
General elective
Cluster elective
Cluster elective

Recommended Cluster Electives:

Computer Applications
Technical Writing
Sociology and Psychology
Computer Programming I and II
Three Dimensional Art
Mass Media Communication Education
Drama
Data Analysis
Two Dimensional Art
Algebra II, Geometry, Chemistry, and Physics

(Three years math and science recommended for college entrance)

BUSINESS, MANAGEMENT, and MARKETING

YEAR 9

English 9
Algebra 1
or Algebra A
Biology
or Biology A
Physical Education
Introduction to Business
General Elective

YEAR 10

English 10
Algebra B
or Algebra I
or Applied Geometry
Biology B
or Chemistry
or Physical Science
Health/Safety
and Speech
African-American History
and Geography
General Elective

YEAR 11

English 11
Algebra 1
or Applied Geometry
or Algebra II
U.S. History-20th Century
Cluster Elective
Cluster Elective
General Elective

YEAR 12

Business English and
Applied Communication
U.S. Government and
Economics for Business
or Psychology
Cluster Elective
Cluster Elective
General Elective
General Elective

Recommended Cluster Electives:

Entrepreneurship
Business Communication
Mass Media Education
Computer Applications
Data Analysis
Office Procedures
Keyboarding
Business Law
Marketing & Advertising
Applied Economics
Algebra II, Geometry, Chemistry, and Physics

(Three years math and science recommended for college entrance)

BUILDING TRADES (COMMERCIAL AND RESIDENTIAL)

YEAR 9
English 9
Algebra 1
or Algebra A
Biology
or Biology A
Physical Education
Cluster Elective
General Elective

YEAR 10
English 10
Algebra B
or Algebra I
or Applied Geometry
Biology B
or Applied Physics
or Physical Science
Health/Safety
and Reading
African-American
History and
Geography
General Elective

YEAR 11
English 11
Algebra 1
or Applied Geometry
or Algebra II
U.S. History-20th Century
Cluster Elective
Building Trades Construction I

YEAR 12
Industrial English and
Applied Communication
U.S. Government and
Consumer Economics
Cluster Elective
General Elective
Building Trades
Construction II

Recommended Cluster Electives:
Introduction to Building Technology
Computer Assisted Drafting
Computer Applications
Science Projects
Algebra II, Geometry, Physics, or Chemistry
Building Trades I or II (11th and 12th grade)
General Business

(Three years math and science recommended for college entrance)

Methods of Teaching Science Courses

All entry level courses will be taught using the Mastery Learning Model. This model divides the marking period into three 3-week modules. The teachers will teach the same adopted essential skills per subject area at the end of which the students will take computer generated competency standardized tests. [Level of expected efficiency -80% (Criteria Reference Test)] The computer generated test shall be randomized per teacher per content area. Objectives will be given to the teachers prior to the start of each 3 week module.

Those students that do not meet the 80th percentile will be referred to the counselor for the Extended Day Remediation Program.

Applied science levels will have the same objectives as the regular course description; however, the teaching method will be different. The science classes will make use of Exploratory Career based Laboratory experiments. We will make use of brief lectures, skills demonstrations, cooperative learning styles, and utilize problem-solving activities congruently with video media. The students will have the opportunity for computer assisted instruction and self-testing programs. We will identify the objective being taught and its career application utilizing concept maps. Math special tutors will also be available. Hands-on discovery labs will be stressed.

Career Awareness Seminars will be given as a teaching pullout. This model utilizes the combined 9th grade population taught at an assembly. Speakers, field trips, etc., will be scheduled twice each marking period according to their application per cluster.

The curriculum is scheduled such that students may choose their clusters at the 9th or 10th grade level without penalty.

MATHEMATICS ESSENTIAL SKILLS

ALGEBRA I: The student will

1. use order of operations in evaluating arithmetic expressions.
2. identify and use the commutative, associative, and distributive properties in evaluating and simplifying first degree expressions containing variables.
3. add, subtract, multiply, and divide integers and evaluate expressions containing than.
4. solve first degree equations algebraically.
5. solve word problems using first degree algebraic equations.
6. solve and graph inequalities.
7. recognize and simplify monomials, binomials, and trinomials.
8. find products of polynomials.
9. factor polynomials correctly
10. solve quadratic equations by factoring, completing the square, and quadratic formula.
11. solve word problems using quadratic equations.
12. write rational expressions in simplest form.
13. add, subtract, multiply and divide rational expressions.
14. solve equations and graph solution sets of equations with absolute value expressions.
15. name and plot points on a coordinate plane.
16. find directed distances.
17. find the slope.
18. write the equation of a line given a) the points, b) slope and y- intercept: c) slope and an arbitrary point on the line.
19. graph a line given its slope and y-intercept or equation.

ALGEBRA II: The student will

1. solve, check and graph linear equations and inequalities in one variable.
2. solve and graph conjunctions, disjunctions of pairs of linear inequalities in one variable.
3. solve and graph absolute value equations and inequalities.
4. solve number relations, consecutive integer, perimeter, age, motion, mixture, and work problems.
5. simplify expressions using the laws of exponents.
6. classify and simplify polynomials.
7. factor quadratic trinomials, perfect square trinomials, difference of squares and sum or difference of cubes.
8. solve and graph quadratic equations and inequalities by factoring.
9. solve work problems by using quadratic equations.
10. simplify rational expressions, indicating values for which said expressions would be undefined.
11. add or subtract rational expressions with the same or different denominators. Find product or quotient of rational expressions.
12. simplify complex rational expressions.
13. solve fractional and literal equations.
14. use long division, synthetic division and the remainder theorem to evaluate polynomials and to determine factors of polynomials.
15. solve quadratic equations by using the definition of square root.
16. find sums, differences, products and quotients of radicals, giving solutions in simplest form.
17. write radical expressions in exponential form or converse.
18. simplify and evaluate expressions containing rational number exponents.
19. solve quadratic equations by completing the square and by the quadratic formula.
20. find the maximum value of a quadratic polynomial.
21. solve radical equations.
22. solve problems about geometric figures with rational and irrational dimensions.
23. solve quadratic equations whose solutions are complex numbers.
24. find the sum, difference, absolute value, product and quotient of complex numbers.
25. study the nature of solutions of a quadratic equation by examining the discriminant of the quadratic formula.
26. given solutions, write quadratic equations.
27. graph linear equations in two variables by using ordered pairs, slope and y-intercept.
28. use the slope, midpoint and distance formulas to write the equations of lines.
29. determine when lines are parallel, perpendicular or neither.
30. prove properties of geometric figures by using slope, distance formula and midpoint formula.
31. solve systems of two or three linear equations graphically and algebraically.
32. find and evaluate determinants of 2 x 2 or 3 x 3 matrices.
33. use determinants to solve systems of equations.
34. determine the domain and range of a relation or function.
35. determine whether a relation is a function and find the value of a function.
36. graph special functions and their inverses.
37. solve problems using correct, inverse, joint, and combined variation.
38. write and graph equations of a circle, ellipse, hyperbola and parabola in standard and non-standard positions.
39. solve and graph linear quadratic and quadratic-quadratic systems of two equations or two inequalities.
40. solve and graph systems of two quadratic equations or inequalities.
41. find a specified term and write several consecutive terms of a given arithmetic
42. find arithmetic and geometric means.

43. use the Binomial Theorem to expand binomials. Find a particular term of an expansion.
44. evaluate a factorial expression.

GEOMETRY: The student will

1. name points lines, rays, segments, angles and planes.
2. use symbols for segments, lines, rays, the length of a segment, the measure of an angle, and congruency.
3. use "If...then" statements and their converses.
4. recognize and apply theorems concerning complementary, supplementary, and vertical angles.
5. distinguish between intersecting, parallel, and perpendicular lines.
6. measure and classify angles.
7. classify triangles according to the measure of their sides and angles.
8. name congruent triangles and corresponding parts.
9. verify the congruency of triangles by applying SAS, SSS, and ASA.
10. identify altitudes of triangles.
11. classify polygons according to the number of sides.
12. find the interior angle sums of complex polygons.
13. explain or identify properties of parallelograms, rectangles, squares, and rhombi.
14. describe a circle and related lines and line segments.
15. identify and measure the arcs of a circle.
16. find the lateral area, total area, and volumes of right prisms and cylinders.
17. state and apply the Pythagorean theorem.
18. state and apply theorems relating to 45-45-90 triangles.
19. calculate the perimeter of a polygon.
20. calculate the circumference of a circle given its radius or diameter.
21. calculate the area of a circle, square, rectangle, and triangle.
22. state and apply the triangle angle sum theorem.
23. read a map.
24. estimate various metric and standard measurements by using reference objects from the real world.
25. know the meaning of metric prefixes and symbols (k, h, d, d, c, m)
26. determine the length of a segment using metric or customary measures.
28. apply the definition of a midpoint of a segment, the bisector of an angle, and the perpendicular bisector of a segment to construct them.
29. apply theorems and corollaries concerning isosceles triangles.
30. state and apply properties of similar polygons.
31. determine the lengths of two sides of a 30-60-90 triangle when the length of the third side is known.
32. compute the geometric mean of two numbers.
33. use the compass and ruler to do simple basic constructions and use the ruler and the protractor to check such constructions.
34. identify the parts of prisms, pyramids, cylinders, and cones.
35. define sine, cosine, and tangent ratios for an acute angle and apply the definitions to solve right triangle problems.

TRIGONOMETRY: The student will

1. define the trigonometric functions.
2. apply the trigonometric functions in a variety of problem-solving situations.
3. without using a table state the values of the trigonometric functions for angles such as 0, 30, 60, 90, and their related angles.
4. use trigonometric tables and interpolate when necessary to find values of trigonometric functions and find the measure of an angle when the value is given.

5. given appropriate data, solve right triangles.
6. convert degree measure to radian measure and vice versa.
7. construct a table with values of sin x, cos. x, and tan x for x = 0 and other common fractional values of pi and multiples thereof, but where 0 <= x <= 2 pi
8. in a Cartesian plane graph the trigonometric functions.
9. define the inverse of the trigonometric functions.
10. solve trigonometric equations and circular function equations.
11. write identities from addition properties of sine and cosine.
12. verify that given statements are identities.
13. given appropriate data, use the law of sines and the law of cosines to solve any triangle.
14. solve appropriate problems using the trigonometric identities e.g., double angle identity, sum/difference angle identities, half-angle identities, etc.
15. state the properties for vectors.
16. solve problems of navigation and/or force by applying vector concepts.
17. define and write polar coordinates.
18. sketch some curves in the polar place.
19. fully explore and use the scientific calculator to solve a variety of problems.
20. use a computer with prepared computer programs as well as develop some of the algorithms for solving problems.
21. find the area of triangles using trigonometric functions.

CALCULUS: The student will

1. find the composite of two functions.
2. find the inverse of a function.
3. find the limit of a function as x approaches a number value.
4. use the four-step method of finding a derivative.
5. use the different rules for finding a derivative (such as constant times a function, quotient, etc.).
6. use the derivative to find the slope of a function.
7. use the derivative to find critical numbers.
8. use the first derivative to find extreme (relative and absolute)
9. use the second derivative to find inflection points.
10. use the second derivative to find concavity.
11. use both the first and second derivative aid in the graphing of functions.
12. use both the first derivative and the second derivative to solve extreme application problems.
13. determine if a function is continuous.
14. find the definite integral of a function.
15. evaluate definite integrals.
16. compute areas of regions with curved boundaries.
17. evaluate definite integrals.
18. find the derivative of composite functions.
19. differentiate implicitly.

SCIENCE ESSENTIAL SKILLS

PHYSICS or APPLIED PHYSICS

Prerequisites: Algebra I, Algebra A, and/or Algebra B, Chemistry, and Geometry or Physical Science. The student will solve simple algebraic equations. The student will understand the factor-label conversion method.

The student will

1. define the following concepts in physics: matter, mass, inertia, density, and energy.

2. use algebra and trigonometry to solve problems with a calculator using scientific notation of large and small numbers.
3. demonstrate the ability to use metric units of mass, length, volume, and time as well as factor-label their conversions.
4. interpret graphs distinguishing between dependent and independent variables as well as calculating slopes of lines.
5. distinguish vector and scalar quantities; distance and displacement, speed and velocity.
6. demonstrate ability to add vectors graphically and mathematically, and to multiply vectors.
7. show ability to resolve vectors into perpendicular components.
8. mathematically calculate force and moving vectors: speed, acceleration, acceleration due to gravity, projectile motion, centripetal acceleration and force, momentum, and apply Newton's laws of motion.
9. be able to use formulas to solve equalities using equations like the law of universal gravitation.
10. define and calculate the types of energy components: kinetic energy, potential energy, work, and power. Apply momentum to problems. Distinguish between elastic and inelastic collisions.

(2nd semester)

1. distinguish heat and temperature demonstrating the ability to convert Celsius to Kelvin and vice versa.
2. solve problems using the heat equations.
3. State and demonstrate the ability to use the equation of the gas laws to solve problems.
4. state and apply the laws of thermodynamics.
5. define entropy.
6. define the concepts of wave theory: velocity, wavelength, frequency amplitude, transverse and longitudinal waves.
7. define how waves behave; constructive and destructive interference, reflection, refraction, diffraction, and Doppler effect.
8. demonstrate ability to use Snell's law to solve problems.
9. describe images formed by mirrors and lenses (plane, convex, and concave).
10. define electrostatic concepts describing objects as charged positive or negative relating this to the behavior of an electroscope.
11. diagram the electric yield between like and unlike electrical charges.
12. solve problems with electrical applications: Coulomb's law, Ohms law.
13. diagram simple series and parallel circuits and use and place meters appropriately (ammeters and voltmeters).
14. explain the relationship between electric and heat energy using proper equations to solve problems.
15. define and calculate voltage, resistance, magnetic field around magnets and wire circuits demonstrating the ability to use the four left-hand rules.
16. explain the design and operation of electric motors, generators, and meters..
17. describe the AC transformer.
18. Explain the Millikan experiment, Rutherford's experiment, the Bohr atom, and the Compton effect.
19. describe the quantum nature of energy.
20. define electron volt.
21. define and illustrate isotopes.
22. identify the electromagnetic spectrum explaining energy levels and bright line spectra.

ESSENTIAL SKILLS FOR GRADE 7 AND 8

Ref: Gary Community School Corporation Curriculum and Instruction Division 1992-93

Chemistry Applications The student will (* BASIC TO ALL SCIENCES)

* 1. practice safety when handling science equipment and chemicals.
* 2. use the scientific method to design and conduct experiments which have control and one variable.
* 3. draw conclusions from scientific information.
* 4. measure and convert SI units of length, volume, mass and temperature.
* 5. collect, interpret and display data in graphs and tables.
6. write simple chemical equations using symbols, formula and words.
7. perform simple experiments distinguishing physical and chemical changes.
8. identify various sources of energy and give advantages and disadvantages of their use.
9. demonstrate simple activities that will illustrate the gas laws.
10. relate heavy to light and floating to sinking with respect to density using the concept to identify simple metal substances.
11. analyze the effects of temperature on solubility.
12. demonstrate how loss or gain of heat energy affects solids, liquids and gases.

Biology Applications: The student will

1. use the microscope to observe live culture and compare cells.
2. identify the life needs and functions of plants and animals.
3. describe the major features of the sun and how solar energy is important to life on earth.
4. draw a basic food chain and identify the producers and consumers, explaining the difference between a symbiotic and parasitic relationship.
5. demonstrate the ability to classify organisms and objects according to common traits.
6. draw, label, and compare the circulatory, respiratory, digestive and nervous system of the grasshopper, earthworm and frog.
7. describe the functions of the human body systems and how they relate to each other.
8. construct a balanced diet containing the six essential nutrients.
9. describe and discuss the causes of disease and the ways preventing diseases including AIDS.
10. explain how genetic traits are passed from generation to generation.
11. identify the causes and effects of pollution proposing solutions.
12. explain the causes and effects of the green house effect on our planet.

Physics Applications: The student will

1. identify various energy sources and explain the relationship of energy to matter.
2. classify simple and compound machines, calculating their mechanical advantages.
3. calculate velocity, acceleration and deceleration.
4. calculate how mass and velocity affect momentum.
5. demonstrate simple activities illustrating Bernoulli's principle, and the gas laws.
6. describe wave properties.
7. demonstrate how sound is made and relates to volume, amplitude, pitch and frequency of waves.
8. identify the types of electromagnetic waves.
9. contrast concave and convex mirrors and their effect on images.
10. differentiate between refraction and reflection.
11. draw parallel and series circuit diagrams understanding voltage and current.
12. distinguish between static and current electricity.
13. demonstrate attraction and repulsion between magnet's poles using iron filings to show magnetic field.
14. compare and contrast nuclear fission and fusion.
15. describe the effects of radiation.

CHEMISTRY

The student will

1. be aware of and practice classroom safety, such as proper handling of chemicals and emergency procedures.
2. be able to pronounce the names of compounds in the list of ingredients on products in grocery, drug, and hardware stores.
3. recognize the difference between organic and inorganic compounds.
4. be able to select the solvent most likely to dissolve a given substance.
5. know the properties of common ionic and covalent compounds.
6. be able to use Fahrenheit and Celsius thermometers to determine the temperature of substances and be able to do the calculations necessary to convert one to the other.
7. show competence in using the metric system in measuring length, volume, and mass.
8. show competence in using laboratory measuring devices such as graduated cylinders, volumetric flasks, burettes, and balances-- both mechanical and digital.
9. perform calculations using scientific notation.
10. use the factor-label method of problem solving.
11. differentiate between physical and chemical changes.
12. list symbols of common elements with their major oxidation numbers.
13. write simple formulas of chemical compounds.
14. name common compounds of which formulas are given.
15. write and balance equations representing four different classifications of reactions.
16. determine the empirical formulas of simple compounds given their percentage composition.
17. calculate the formula mass of any given substance.
18 state Avogadro's number.
19. define the mole and perform mole-mass-volume calculations.
20. solve problems based on mass relationships in chemical reactions.
21. determine the number of moles in a given mass of a specific substance.
22. calculate the percentage composition of any compound.
23. differentiate among the electron, proton, and neutron, and indicate the electrical charge and relative mass associated with each particle.
24. define atomic number, mass number, and their relationship to isotopes.
25. write an electron configuration for any atom using the diagonal rule.
26. draw a Lewis electron dot diagram for any atom.
27. describe the organization of the periodic table.
28. distinguish among metals, nonmetals, and metalloids.
29. determine the chemical reactivity characteristics of an element knowing its location on the periodic table and knowing the octet rule.
30. predict the oxidation number of an element given the element's location in the periodic table.
31. define and use electro negativities to predict the degree of covalent/ionic bonding that will form between given atoms.
32. read graphs of vapor pressure versus temperature, pressure versus volume, and volume versus temperature.
33. use Boyle's, Dalton's, Charles', and the ideal gas law to solve gas related problems.
34. use the concept of limiting reactants to solve stoichiometric problems.

BIOLOGY

Prerequisites: Middle school basic skills

The Student will

1. identify abiotic and biotic factors within the living world of biology.
2. define the subject of biology and identify branches of biology.
3. recognize carbohydrates, fats, proteins, and nucleic acids.

4. label major cell structures and relate life activities on a cellular level.
5. explain the energy pyramid and relate prey/predator factors in an ecological system.
6. do simple Punnett square probabilities in heredity.
7. identify and explain the functions of the principle nucleic acids important in exploring heredity.
8. differentiate between meiosis and mitosis.
9. give specific examples of how plants and animals reproduce.
10. explain the basic arguments in evolution including "survival of the fittest," adaptation, and speciation.
11. state the 5 kingdom classification system.
12. identify at least 3 taxonomic systems.
13. explain the characteristics and give examples of protists characteristics of the plant kingdom.
14. outline the organization and principle characteristics of the plant kingdom.
15. outline the organization and principle characteristics of the animal kingdom.
16. identify and explain one example in detail of a member of the plant kingdom in the areas of: digestion, transport, respiration, excretion support and locomotion.
17. identify and explain one example in detail of a member of the animal kingdom in the areas of: digestion, transportation, respiration, excretion support, and locomotion.

PHYSICAL SCIENCE

Prerequisites: Algebra I, Algebra A, and/or Algebra B

The student will solve simple algebraic equations.
The student will understand the factor-label conversion method.

The Student will

1. name units of the metric system and make simple measurements using them (measure and convert SI units of length, volume, mass, and temperature).
2. use the scientific method to design and conduct experiments which have control and variables.
3. define and distinguish atoms, molecules, elements, mixtures, and compounds with reference to their state of matter (gas, liquid, and solid).
4. define physical and chemical changes and properties.
5. define and measure the density of common metals and liquids.
6. understand the law of definite proportions.
7. use the periodic table to identify the atomic number, atomic mass, chemical families and oxidation number of an element.
8. explain how the elements combine to form compounds. Explain covalent and ionic bonds.
9. draw an atomic model of the simple elements.
10. define kinetic theory of matter and demonstrate ability to explain how these forces play to determine state of matter.
11. identify properties of salts, acids and bases; be able to use indicators to distinguish pH.
12. write simple chemical equations using symbols, formulas and words distinguishing the four basic types of chemical reactions.
13. describe how nuclear fission and fusion may be used as a source of energy discussing safety rules for radiation produced in nuclear reactors.
14. define how energy may be radiated, convected, conducted.
15. outline properties of common gases in the atmosphere and describe their laboratory and industrial preparations.
16. define respiration and photosynthesis.
17. demonstrate ability to measure and calculate (using simple formulas) speed, velocity, force, work, momentum, and acceleration.
18. give example of Newton's laws of motion.
19. describe wave phenomena.

Questions and notes, June 1995

a) How is each class divided Do we teach in different segments?
b) Are we going to get new books for the classes if necessary?
c) What are the objectives to be tested on the GATEWAY test?
d) Does Tech Prep begin in the Fall?
e) What happens to the 10th, 11TH, and 12th graders?
f) Will there be screening or non-credit remediation?
g) Will there be an attendance policy?
h) Are the pre-level classes designed as remediation?

All first year students should have Career Awareness classes in all clusters. There should be a middle level biology course and an applied chemistry for students with a grade lower than a "C" in Algebra.

* Building Trades: Trigonometry and other higher math needed.
* Business/Management: okay
* Audio & Visual Communication: Change name to Information systems technology. Academic okay, perhaps students should be mandated to take more computer courses versus given them an option/elective.
* Industrial & Manufacturing technology: more mathematics and science for the four years should be available, almost required for at least three years is suggested, this depends on the chosen career. Added to the career areas there should be engineering technology, etc.

Merrillville High School

Tech Prep Clusters:

Business and Marketing Cluster

Health and Human Services

Manufacturing

Ken Coudret, Andrea Rybolt, Violet Schmuck,
Alan Branda, Don Slys

Merrillville High School Tech Prep Clusters

Group members: Ken Coudret, Andrea Rybolt, Violet Schmuck, Alan Branda, Don Slys

Targeted Student Population The Tech Prep program is recommended for those students who have decided that after high school they will be pursuing additional education at trade schools, business schools, two year programs leading to associates degrees, or imme-diate employment in the workplace. This would be in contrast to students who have made 4 year academic college programs leading to a bachelor's degrees as their goals. However, students who declare a Tech Prep sequence would not be locked out of an opportunity to enter a 4 year college program but would be subject to various entry level criteria used by different colleges.

Tech Prep Courses: Tech Prep courses have specific educational purposes in mind. These purposes are to provide for the mastery of certain skills through practical hands-on applications. Students will declare an interest in a particular career cluster in which appropriate elective courses will be taken.

Business and Marketing subclusters: Accounting, Business Management, Computers, Information / Data Management, Secretarial, Marketing

Health and Human Servicessubclusters: Nursing, Lab Technicians, Medical Assistants, Child Care, Personal Care, Food Preparation

Manufacturing subclusters: Auto, Woods, Metals, Plastics, Electronics, Building Construction, Graphic Arts, Technical Drawing, Manufacturing

Tech Prep is designed to give the student basic technical skills and knowledge for entering any of these three programs. However, a student that goes to work directly out of high school will be limited in the number of occupational choices since most employers are requiring a person with greater skill. The student who enters a 4 year program must meet the requirements of that program. A student in the business cluster would be required to take Chem Tech in order to meet the requirements.

Each cluster provides a sufficient number of electives to allow for individual development. For example, a student in the business cluster has 17 semesters of electives available.

The courses taken by 9th graders in the Tech Prep program are essentially core courses, with the exception of the 'Student Success Skill' course. These courses are designed to meet the requirements of the Gateway Exam. Furthermore, the Student Success Skills course should help the student prepare for the exam more successfully.

The two clusters of 'Health / Human Services' and 'Manufacturing' meet and exceed the Indiana Core 40 competencies. The 'Business / Marketing' cluster will meet the requirements if the student completes Chem Tech.

The success of the program could be judged by analyzing the number of courses and section offered by the school based on student demand. By keeping records or post graduate activities the Tech Prep curriculum could be analyzed. However, the true success will only be measured over the span of 10 to 20 years.

Curriculum Outline

Business and Marketing
Recommended Course Sequence

9	Sem 1	9th Composition	Pre-Algebra or Algebra 1	Biology 1	Success Skills/ Careers	Elective	U.S. History 1
	Sem 2	9th Literature	Pre-Algebra or Algebra 2	Biology 2	Health & Safety	Elective	Keyboarding
10	Sem 1	Survey Literature	Applied Math 1	Physical Science 1	Computer Applications	Elective	Physical Education 1
	Sem 2	Intermediate Composition	Applied Math 2	Physical Science 2	Elective	Elective	Physical Education 2
11	Sem 1	Tech Prep Communications 1	Math Tech 1	Chem Tech 1*	Elective	Elective	U.S. History 2
	Sem 2	Tech Prep Communications 2	Math Tech 2	Chem Tech 2*	Elective	Elective	World Issues
12	Sem 1	English	Elective	Elective	Elective	Elective	Government
	Sem 2	English	Elective	Elective	Elective	Elective	Economics

Subclusters: Accounting, Business Management, Information / Data Management, Computers, Secretarial, Marketing

Suggested Electives: Accounting, Business Law, Record Keeping, Information Processing, Office Procedure, Salesmanship, Administrative Support (CO), Criminal / Contract Law, Business Computer Applications

* This course is highly recommended

Manufacturing
Recommended Course Sequence

9	Sem 1	9th Composition	Pre-Algebra or Algebra 1	Biology 1	Success Skills/ Careers	Elective	U. S. History 1
	Sem 2	9th Literature	Pre-Algebra or Algebra 2	Biology 2	Health & Safety	Elective	Keyboarding
10	Sem 1	Survey Literature	Applied Math 1	Physical Science 1	Computer Applications	Elective	Physical Education 1
	Sem 2	Intermediate Composition	Applied Math 2	Physical Science 2	Elective	Elective	Physical Education 2
11	Sem 1	Tech Prep Communications 1	Math Tech 1	Chem Tech 1	Elective	Elective	U.S. History 2
	Sem 2	Tech Prep Communications 2	Math Tech 2	Chem Tech 2	Elective	Elective	World Issues
12	Sem 1	English	Math Tech 3	Applied Physics 1	Elective	Elective	Government
	Sem 2	English	Math Tech 4	Applied Physics 2	Elective	Elective	Economics

Subclusters: Auto, Woods, Metals, Plastics, Electronics, Building Construction, Graphic Arts, Technical Drawing, Manufacturing

Suggested Electives: 9th Grade Industrial Arts (2 semesters), Drafting (CAD) 1 & 2, Drafting (CAD) 3 & 4, Architectual Drawing & Design, Technical Illustration, Metals 1 & 2, Metals 3 & 4, Welding 1 & 2, Building Trades, Wood Shop 1 & 2, Wood Shop 3 & 4, Machine Shop 1 & 2, Machine Shop 3 & 4, Power & AutoMechanics 1 & 2, Power & AutoMechanics 3 & 4, Graphic Arts 1 & 2, Graphic Arts-Production Printing, Basic Electricity, Advanced Electronics, Digital Electronics / Computer Diagnostics, Plastics 1 & 2, Plastics 3 & 4, Industrial Plastics

Health and Human Services
Recommended Course Sequence

9	Sem 1	9th Composition	Pre-Algebra or Algebra 1	Biology 1	Success Skills/ Careers	Elective	U.S. History 1
	Sem 2	9th Literature	Pre-Algebra or Algebra 2	Biology 2	Health & Safety	Elective	Keyboarding
10	Sem 1	Survey Literature	Applied Math 1	Physical Science 1	Computer Applications	Elective	Physical Education 1
	Sem 2	Intermediate Composition	Applied Math 2	Physical Science 2	Elective	Elective	Physical Education 2
11	Sem 1	Tech Prep Communications 1	Math Tech 1	Chem Tech 1	Elective	Elective	U.S. History 2
	Sem 2	Tech Prep Communications 2	Math Tech 2	Chem Tech 2	Elective	Elective	World Issues
12	Sem 1	English	Elective	Human Physiology	Elective	Elective	Government
	Sem 2	English	Elective	Anatomy	Elective	Elective	Economics

Subclusters: Nursing, Lab Technicians, Medical Assistants, Child Care, Personal Care, Food Preparation

Suggested Electives: Interpersonal Relationships, Fitness & Nutrition, Food & Nutrition, Singles Living, Child Development, Family Health, Parenting, Child Care Assistant Training, HERO

Course Descriptions

CHEM TECH

A. **Course Description**: Chemistry is the study of the substances in our world. As we increase our use of and dependence on technology, more and more of the decisions made by individuals, communities, and countries will involve scientific concepts and consequences. Everyone should know about scientific concepts and the vital contributions of science to society in order to make decisions on issues involving chemical knowledge. The course will emphasize technology, which has become so vital to the planet and its people.

B. **Course Goals**
1. To realize the important role that chemistry will play in their personal and professional lives.
2. To use principles of chemistry to think more intelligently about current issues they will encounter that involve science, technology, society, and the environment.
3. To develop a lifelong awareness of the potential, limitations, and interdependence of science, technology, society, and the environment.
4. To incorporate technology into the chemical processes that play such a vital role in our society.
5. To exercise technical skills necessary for further science education or to enter the workforce.
6. To use problem solving skills and science process skills in conducting investigations.
7. To demonstrate proper selection, use, and care of tools, equipment, and laboratory instruments.
8. To demonstrate proper use of a microcomputer or calculator to assist in data collection and analysis.
9. To exhibit productive behavior as a member of a project team.

C. **Course Prerequisites**: Physical Science, Algebra

D. **Text**: *Chemcom:* Kendall/Hunt Publishing Company, 1993

E. **Method / Approach**: Cooperative Learning, lecture, discovery, lab experiments, use of audio-visual materials are methods which will be used in teaching this course. The course will focus on problem solving and hands on applications.

PHYSICAL SCIENCE 1 and 2

A. **Course Description**: Physical Science is a survey of physics and chemistry designed to meet the needs of two categories of students:
1. Technology Preparation students. Physical Science fulfills the state Physical Science graduation requirement.
2. College bound students. Physical Science provides additional background and instruction in the fundamentals of physics and chemistry, especially for the non-science oriented or lower math level student.

Hands-on activities and practical application of concepts will be emphasized.

B. **Course Objectives**: Physical Science is intended to provide students with an educational environment which will enable them to

1. recognize science as both a body of information and a methodology for problem solving.
2. apply the scientific method for use in drawing acceptable conclusions from the data available to them.
3. develop the ability to use standard tools of measurement effectively, and to express those measurements accurately and with the proper units.
4. become familiar with common laboratory equipment and the safe use of that equipment.
5. use symbols, formulae, and mathematics to accurately describe physical, chemical, and nuclear activity.
6. develop a lifelong awareness of the potential, limitations, and interdependence of science, technology, society, and the environment.
7. incorporate technology into the physical and chemical processes that play such a vital role in our society.
8. exercise technical skills necessary for further science education or to enter the workforce.
9. use problem solving skills and science process skills in conducting investigations.
10. demonstrate proper use of a microcomputer or calculator to assist in data collection and analysis.
11. exhibit productive behavior as a member of a project team.

C. **Course Prerequisites**: Successful completion of 8th grade General Science or its equivalent.

D. **Text and Materials**

1. *Physical Science*. Marilyn Thompson, Richard G. Smith, Jack T. Ballinger. Westerville, Ohio, Glencoe Division of Macmillan/McGraw-Hill Publishing Company, 1993.
2. Teacher prepared worksheets, diagrams, quizzes, puzzles, and study guides.
3. Tests drawn in part from the cited teacher resource book.
4. Computer software from the school library.
5. Selected audio-visual materials from the school library and from the Northwest Indiana Educational Service Center.

BIOLOGY 1 and 2

A. **Course Description**: Biology is a two semester course designed to introduce the student to as much information about the living world as possible in a lecture, demonstration, and laboratory setting. Hands-on experiences and practical application will be emphasized.

B. **Course Objectives**:

1. To develop a lifelong awareness of the potential, limitations, and interdependence of science, technology, society, and the environment.
2. To incorporate technology into the biological processes that play such a vital role in our society.
3. To exercise technical skills necessary for further science education or to enter the workforce.
4. To use problem-solving skills and science process skills in conducting investigations.
5. To demonstrate proper selection, use, and care of tools, equipment, and laboratory instruments.
6. To demonstrate proper use of a microcomputer or calculator to assist in data collection and analysis.
7. To exhibit productive behavior as a member of a project team.

C. **Course Prerequisites**: Successful completion of 8th grade science or its equivalent.

D. **Text and Materials**:
1. *Biology: Visualizing Life*, George B. Johnson and Gary J. Brusca, Holt, Rhinehart, and Winston, Inc., 1994.
2. Laboratory/workbook/supplemental materials accompanying cited textbook.
3. Teacher prepared worksheets.
4. Test and quizzes accompanying cited textbook.
5. Computer software from the school library.
6. Selected video cassettes, 16mm. films, and sound filmstrips from the school library.
7. Life Science laser video discs

PRE-ALGEBRA

A. **Course Description**: This course introduces algebra and integers early. Problem solving, applications, and communication skills are essential and interrelated elements of each chapter. Algebra, geometry, and other mathematical topics are carefully integrated in a format that connects mathematics to students' lives and the world of work.

B. **Course Objectives**: Students will be able to
1. use the language of algebra.
2. add, subtract, multiply, and divide integers.
3. solve equations and inequalities.
4. factor expressions and manipulate fractions.
5. add, subtract, multiply, and divide rational numbers.
6. graph equations and inequalities.
7. solve proportion and percent problems.
8. interpret statistics and graphs.
9. figure the probability of simple events.
10. apply algebra to geometry problems.
11. calculate area and volume.
12. apply algebra to right triangles.
13. add and subtract polynomials.

C. **Textbook/ Supplemental Materials**: *Pre-Algebra*: Price, Rath, and Leschensky, Glencoe Publishing. Also used are practice worksheets, reteaching worksheets, rests, and transparencies provided with the textbook.

D. **Audio Visual Materials Used** :
Computer: IBM Math Concepts, CTBS, IBM Math Practice, IBM Math Toolkit

E. **Method/Approach**: Traditional teaching styles will be used, but the teacher is encouraged to use hands-on, cooperative learning, and as many discovery activities as possible.

F. **Cluster Reference**: This is a basic math course applicable to both Tech Prep and College Prep course sequences. As many job situations as possible should be included in the problems presented.

G. **Prerequisites**: As this is the lowest level math course offered at the high school, there can be no prerequisites for this course. Any student may choose to take this course.

ALGEBRA 1 and 2

A. **Course Description**: This course provides a formal development of algebraic skills and concepts necessary for students who will take a geometry course and other advanced college preparatory courses. Algebra includes equalities, graphing of solution sets, solving systems of equations, and quadratic equations, use of exponents, and introductory topics of statistics and probability.

B. **Course Competencies**: This first year of algebra focuses on problem-solving abilities when unknowns are involved, and on applying these abilities to various situations.

C. **Topics included are**:
1. Variables, equations, and applications
2. Operations with real numbers
3. Solving equations
4. Operations with polynomials
5. Graphing relations and functions
6. Solving systems of sentences
7. Fractions
8. Factoring polynomials
9. Rational and irrational expressions
10. Radicals and quadratic equations
11. Applications of fractions and equations
12. Solving inequalities
13. Graphing relations and functions

D. **Textbooks and Supplemental Materials used**: *Algebra: Structure and Method Book 1*, Houghton Mifflin. Teacher's Resource File, and algebra tiles.

E. **Audio/ Visual Materials used**: none

F. **Method/ Approach**: Traditional teaching styles will be used, but the teacher is encouraged to use hands-on, cooperative learning, and as many discovery activities as possible.

G. **Cluster Reference**: This is a basic math course applicable to both Tech Prep and College Prep course sequences. As many job situations as possible should be included in the problems presented.

H. **Prerequisites**: Students must have complete eighth grade math with 80% competency, or have completed Pre-Algebra with 80% competency.

MATH FOR TECHNOLOGY I

A. **Course Description**: This course gives careful treatment to important topics of number, variable, relation, function, equation, inequality, and probability. The vocabulary and symbolism of modern mathematics is stressed. Students will apply math skill to problems within each of our clusters.

B. **Course Objectives:** To give students a solid preparation for technical mathematics, students will do activities and problem solving with the following topics:
1. Basic concepts of algebra.
2. Inequalities and proofs.
3. Linear equations and functions.
4. Products and factors of polynomials.
5. Rational expressions.
6. Irrational and complex numbers.
7. Quadratic equations and functions.
8. Variation and polynomial equations.
9. Analytic geometry.
10. Exponential and logarithmic functions.
11. Correlation between functions and their graphs.

C. **Textbook Used:** Mathematics

D. **Method/Approach:** The teaching style for this course includes hands-on activities, discovery activities, labs, cooperative learning, and performance based evaluation techniques.

E. **Cluster Reference:** Occasionally, the task at hand may apply more directly to a specific cluster such as Business as opposed to Health. Teaching the concepts and applications will require that teachers be trained in those areas or at least learn more about practical applications with respect to a specific occupation within a cluster.

F. **Prerequisites:** Complete Applied Math I with 70% competency or Plain Geometry with 60% competency.

MATH FOR TECHNOLOGY II

A. **Course Description:** This course is a study of elementary functions. Polynomial, exponential, logarithmic, trigonometric, and probability functions are studied with a depth to be determined by available time. Sequences and series are considered, which leads to the concept of a limit. Students will apply math skills to problems within the Manufacturing/Industry Cluster.

B. **Course Objectives:** To give students a solid preparation for technical mathematics, students will do activities and problem solving with the following topics:
1. Coordinate geometry.
2. Polynomials.
3. Inequalities.
4. Functions.
5. Exponents.
6. Advanced graphing.
7. Complex numbers.
8. Conic sections.
9. Sequences and series.
10. Statistics.
11. Probability.
12. Permutations and Combinations.
13. Logarithms.

C. **Textbooks Used**: *Advanced Mathematics*, Brown: Houghton, Mifflin Publishers.

D. **Audio-visual Materials Used**: Computer programs: IBM Math Toolkit
Calculators: Scientific

E. **Method/Approach**: The teaching style for this course includes hands-on activities, discovery activities, labs, cooperative learning, and performance based evaluation techniques.

F. **Cluster Reference**: Teaching the concepts and applications will require that teachers be trained in those areas or at least learn more about practical applications with respect to a specific occupation within a cluster.

G. **Prerequisites**: Complete Math for Technology I with 60% competency or Plain Geometry and Algebra II with 60% competency each.

APPLIED MATHEMATICS I and II.

A. **Course Description**: This course is designed for students who plan a vocational or technical career. It helps students develop and refine their arithmetic skills using current technology and real-life applications which illustrate the usefulness of mathematics. The video programs and the hands-on laboratory activities included in the course stress real-world job situations. Some topics included are problem-solving techniques, measuring, using graphs, working with lines and angles, two-dimensional shapes, three-dimensional shapes, ratios and proportions, tolerance and using formulas. Students will apply skills to problems within each of our clusters.

B. **Course Objectives**: This course includes materials which help students develop and refine job-related mathematical skills.
1. Calculator review.
2. Learning problem-solving techniques.
3. Estimating.
4. Measuring in English and Metric units.
5. Graphs, charts, and tables.
6. Lines and angles.
7. Dealing with data.
8. Shapes in two- and three-dimensions.
9. Ratios and proportions.
10. Scale drawings.
11. Signed numbers and vectors.
12. Scientific notation.
13. Precision, accuracy, and tolerance.
14. Solving problems with powers and roots.

C. **Textbook Used**: *Applied Mathematics*, Developed by the center for occupational research and development. Waco, Texas. Copyright 1988.

D. **Workshops/Supplemental Materials Used**: Many items are used to supplement the lab activities. These include the following:
1. Geometry
2. Calculators

3. Compasses
4. Newspapers
5. Two liter containers
6. Soda cans
7. Accu-line materials
8. Measuring tapes
9. Meter sticks

E. **Audio-Visual Materials Used**: Applied Mathematics videos are used to introduce each unit.

F. **Method/Approach**: The teaching style for this course includes hands-on activities, discovery activities, labs, cooperative learning, and performance based evaluation techniques.

G. **Cluster Reference**: Occasionally, the task at hand may apply more directly to a specific cluster such as Business as opposed to Health. Teaching the concepts and applications will require that teachers be trained in those areas or at least learn more about practical applications with respect to a specific occupation within a cluster.

H. **Prerequisites**: Complete Pre-Algebra with 70% competency or Algebra with 60% competency. Students must also have an eighth grade reading level.

Roosevelt High School

Tech Prep Clusters:

Manufacturing and Engineering Technology

Health and Human Services

Residential and Commercial Construction

Marketing and Merchandising Technology

Deborah Abrahamson, Faye Barnes, Rita Magee,
Cecil McClendon, Patricia Ann Presley, and Brenda Quaak

Roosevelt High School Tech Prep Clusters

Group Members: Deborah Abrahamson, Faye Barnes, Rita Magee, Cecil McClendon, Patricia Ann Presley, and Brenda Quaak

Some technical experience will open more doors than just Core 40 requirements. Tech Prep will allow the students to learn skills and build a better understanding of the skills that are needed to do a particular job. Hopefully the Tech Prep will give the students the skills to continue to learn.

Students could possibly test out of basic courses or non-credit courses in the technical and associate level programs. It will also allow success in graduation in a 2 or 4 year program with a lower probability of remediation.

Students could possibly test out of basic courses or noncredit courses, therefore enable the students to take more advanced technology in a 4 year program. It will also allow success in graduation in a 4 year program with a lower probability of remediation.

Students with high level of ability may be allowed to test out of low level or introductory level courses and move straight into a higher level courses. The student must pass with a 90% competency to do this. Hands-on, oral and written communication of problem solving will help prepare the students to handle Gateway's extensive explanations more successfully. Students' participation in Tech Prep clusters must be very focused. Core 40 and Tech Prep together allow for very little deviation from the planned schedules.

Success can be determined by the results of the Gateway exam and individual course competency exams with a range from 80% to 90% on individual courses. The final goal is that at least 50% of our students will be enrolled in and will successfully complete a Tech Prep curriculum. With success of the program, the students will experience success in future post-secondary education and employment.

CURRICULUM OUTLINE

Manufacturing and Engineering Technology Cluster

The Manufacturing and Engineering Technology cluster will allow students the opportunity to graduate from high school with skills applicable to the workplace and to post-secondary education. Students can achieve a hands-on, communication-filled education that readies them for choices to be made in the future. In this particular cluster students can make the choice of several careers and they can determine what levels of skills they wish to pursue after high school. Some possible career opportunities are: Tool die makers, welding, electronics, heating and cooling technician, auto designer, and drafter.

EIGHTH GRADE:	MATH
	ENGLISH
	INTEGRATED SCIENCE
	HISTORY
	P.E.
	CAREER AWARENESS - 1 SEMESTER
NINTH GRADE:	PRE-ALGEBRA / ALGEBRA
	APPLIED INTEGRATED SCIENCE/ APPLIED BIOLOGY
	KEYBOARDING - 1 SEMESTER
	COMPUTER APPLICATIONS - 1 SEMESTER
	ENGLISH I
	INTRODUCTION TO TECHNOLOGY
	P.E.

TENTH GRADE:	ALGEBRA / GEOMETRY
	APPLIED BIOLOGY / APPLIED CHEMISTRY
	AFRICAN AMERICAN HISTORY - 1 SEMESTER
	SPEECH - 1 SEMESTER
	ENGLISH 2
	DRAFTING / CAD
	WORLD HISTORY / GEOGRAPHY - 1 SEMESTER
	HEALTH AND SAFETY - 1 SEMESTER
ELEVENTH GRADE:	ENGLISH 3 / BUSINESS COMMUNICATIONS
	GEOMETRY / ALGEBRA II
	U.S. HISTORY
	APPLIED CHEMISTRY / APPLIED PHYSICS I
	ELECTRICITY
	MANUFACTURING PROCESS
TWELFTH GRADE:	ENGLISH 4 / APPLIED COMMUNICATIONS
	GOVERNMENT - 1 SEMESTER
	APPLIED ECONOMICS - 1 SEMESTER
	ALGEBRA II / MATH ANALYSIS / PROB AND STAT - DISCRETE MATH
	APPLIED PHYSICS I / APPLIED PHYSICS II / ADV. CHEMISTRY
	PRODUCT MATERIALS AND MEASUREMENT

Health and Human Services Cluster

The Health and Human Services cluster will allow students the opportunity to graduate from high school with skills applicable to the workplace and to post-secondary education. Students can achieve a hands-on, communication filled education that readies them for choices to be made in the future. In this particular cluster students can make the choice of several careers and they can determine what levels of skills they wish to pursue after high school. Some possible career opportunities are: Nursing, medicine, medical technician, child care, food service, dietician, and physical therapist.

EIGHTH GRADE:	MATH
	ENGLISH
	INTEGRATED SCIENCE
	HISTORY
	P.E.
	CAREER AWARENESS - 1 SEMESTER
NINTH GRADE:	PRE-ALGEBRA / ALGEBRA
	APPLIED INTEGRATED SCIENCE/ APPLIED BIOLOGY
	KEYBOARDING - 1 SEMESTER
	COMPUTER APPLICATIONS - 1 SEMESTER
	ENGLISH I
	INTRODUCTION TO TECHNOLOGY
	P.E.
TENTH GRADE:	ENGLISH II
	ALGEBRA I / GEOMETRY
	APPLIED BIOLOGY / APPLIED CHEMISTRY
	AFRICAN AMERICAN HISTORY - 1 SEMESTER

SPEECH - 1 SEMESTER
METHODS & TECHNIQUES IN CHILD CARE I
WORLD HISTORY / GEOGRAPHY - 1 SEMESTER
HEALTH AND SAFETY - 1 SEMESTER

ELEVENTH GRADE: ENGLISH III / APPLIED COMMUNICATIONS
GEOMETRY / ALGEBRA II
U.S. HISTORY
APPLIED CHEMISTRY / APPLIED PHYSICS
METHODS & TECHNIQUES IN CHILD CARE II
MEAL PLANNING & FOOD PREPARATION I

TWELFTH GRADE: ENGLISH IV / APPLIED COMMUNICATIONS
GOVERNMENT - 1 SEMESTER
APPLIED ECONOMICS - 1 SEMESTER
ALGEBRA II / MATH ANALYSIS / PROB AND STAT - DISCRETE MATH
HUMAN ANATOMY & PHYSIOLOGY / ADVANCED CHEMISTRY
METHODS & TECHNIQUES IN CHILD CARE III
MEAL PLANNING & FOOD PREPARATION II

CLUSTER: Residential and Commercial Construction

The Residential and Commercial Construction Technology cluster will allow students the opportunity to graduate from high school with skills applicable to the workplace and to post-secondary education. Students can achieve a hands-on, communication filled education that readies them for choices to be made in the future. In this particular cluster students can make the choice of several careers and they can determine what levels of skills they wish to pursue after high school. Some possible career opportunities are: Carpenter, mason, plasterer, roofer, furniture maker, wood machinist, and joiner.

EIGHTH GRADE: MATH
ENGLISH
INTEGRATED SCIENCE
HISTORY
P.E.
CAREER AWARENESS - 1 SEMESTER

NINTH GRADE: PRE-ALGEBRA / ALGEBRA
APPLIED INTEGRATED SCIENCE/ APPLIED BIOLOGY
KEYBOARDING - 1 SEMESTER
COMPUTER APPLICATIONS - 1 SEMESTER
ENGLISH I
INTRODUCTION TO TECHNOLOGY
P.E.

TENTH GRADE: ENGLISH II
ALGEBRA I / GEOMETRY
APPLIED BIOLOGY / APPLIED CHEMISTRY
AFRICAN AMERICAN HISTORY - 1 SEMESTER
SPEECH - 1 SEMESTER
GEOGRAPHY - 1 SEMESTER
WOODWORKING TECHNIQUES
HEALTH AND SAFETY - 1 SEMESTER

ELEVENTH GRADE:
ENGLISH III / APPLIED COMMUNICATIONS
GEOMETRY / ALGEBRA II
U.S. HISTORY
APPLIED CHEMISTRY / APPLIED PHYSICS
DRAFTING I & CAD I
APPLIED CARPENTRY I - 1 SEMESTER
APPLIED MASONRY I - 1 SEMESTER

TWELFTH GRADE:
ENGLISH IV / APPLIED COMMUNICATIONS
GOVERNMENT - 1 SEMESTER
APPLIED ECONOMICS - 1 SEMESTER
ALGEBRA II / MATH ANALYSIS / PROB AND STAT - DISCRETE MATH
ADVANCED APPLIED CHEMISTRY / APPLIED PHYSICS II
BUILDING & SAFETY CODES - 1 SEMESTER
CARPENTRY II - 1 SEMESTER
MASONRY II - 1 SEMESTER
ROOFING, GUTTER & DOWN SPOUT INSTALLATION. - 1 SEMESTER

CLUSTER: Marketing and Merchandising Technology

The Marketing and Merchandising Technology cluster will allow students the opportunity to graduate from high school with skills applicable to the workplace and to post-secondary education. Students can achieve a hands-on, communication filled education that readies them for choices to be made in the future. In this particular cluster students can make the choice of several careers and they can determine what levels of skills they wish to pursue after high school. Some possible career opportunities are: Accounting, office management, sales, marketing, banking, travel agent, insurance, and customer service.

EIGHTH GRADE:
MATH
ENGLISH
INTEGRATED SCIENCE
HISTORY
P.E.
CAREER AWARENESS - 1 SEMESTER

NINTH GRADE:
PRE-ALGEBRA / ALGEBRA
APPLIED INTEGRATED SCIENCE/ APPLIED BIOLOGY
KEYBOARDING - 1 SEMESTER
COMPUTER APPLICATIONS - 1 SEMESTER
ENGLISH I
INTRODUCTION TO TECHNOLOGY
P.E.

TENTH GRADE:
ENGLISH II
ALGEBRA I / GEOMETRY
APPLIED BIOLOGY / APPLIED CHEMISTRY
AFRICAN AMERICAN HISTORY - 1 SEMESTER
SPEECH - 1 SEMESTER
OFFICE PROCEDURES (MARKETING & MERCHANDISING
HEALTH AND SAFETY - 1 SEMESTER
GEOGRAPHY - 1 SEMESTER

ELEVENTH GRADE: ENGLISH III / APPLIED COMMUNICATIONS
GEOMETRY / ALGEBRA II
U.S. HISTORY
APPLIED CHEMISTRY / APPLIED PHYSICS
ACCOUNTING I
ENTREPRENEURSHIP

TWELFTH GRADE: ENGLISH IV / APPLIED COMMUNICATIONS
GOVERNMENT - 1 SEMESTER
ALGEBRA II / MATH ANALYSIS / PROB AND STAT - DISCRETE MATH
BUSINESS LAW
MARKETING & ADVERTISING I
APPLIED ECONOMICS - 1 SEMESTER

Eighth Grade Math Prerequisites

It is important that students master basic math skills and knowledge. The following competencies should be met upon completing the eighth grade.

Students will:

1. Read, write, round, compare, and order whole numbers and decimals and give the value of each digit.
2. Use estimation to determine the reasonableness of an answer.
3. Use exponents to express multiple factors of a number and find the product for a power of a number.
4. Find the greatest common factor of two numbers.
5. Find the least common multiple of two numbers.
6. Use the divisibility rules for numbers divisible by 2, 3, 4, 5, 6, 8, 9, and 10.
7. Tell what a given fraction means in terms of division.
8. Compare and order fractions
9. Recognize and classify a polygon according to the number of sides
10. Find the perimeter of a polygon
11. Find averages of a set of numbers
12. Write fractions as decimals rounded to the nearest hundredth.
13. Identify a reference object to represent each of the most commonly used metric units of length, capacity, and mass.
14. Convert commonly used metric units of length, mass and capacity to other metric units using decimal relationships.
15. Find unit prices.
16. Add, subtract, and multiply both integers and rationals, and divide one rational by another.
17. Use Formulas for perimeters of polygons, circumferences of circles, and areas of both.
18. Organize simple data.
19. Find probabilities that given events will occur.
20. Use calculators efficiently to perform basic operations.

Eighth Grade Science Prerequisites

It is important that students master basic science skills and knowledge. The following competencies should be met upon completing the eighth grade.

Students will

1. have successfully completed 8th grade math competencies.
2. be knowledgeable of the five kingdoms of living things.
3. be knowledgeable of the scientific method of problem solving and the steps required for solving problems in the lab.
4. be familiar with data collection and analysis.
5. be familiar with SI units and be able to perform simple conversions.
6. know basic atomic structure.
7. interpret the periodic table and be able to read the key.
8. know basic nomenclature and how to balance simple equations.

COURSE DESCRIPTIONS

PRE-ALGEBRA

A. PREREQUISITES: 8th grade competencies

B. GENERAL OUTCOMES: Develop problem-solving techniques.
   1. Maintain basic skills competencies and become proficient with the calculator.
   2. Create a solid background in systems and equation solving techniques.
   3. Develop strong oral and written communication skills to solve problems.
   4. Develop technical skills.

C. METHOD / APPROACH: Emphasis will be placed on a discovery approach to learning with some cooperative learning being used. Technology assisted learning will be implemented with the use of computers and graphing calculators.

D. CLUSTER SPECIFIC PROBLEMS OR SITUATIONS MIGHT BE INCLUDED IN THE INSTRUCTION: An electrician calculates the total electrical power needed for a house by adding the wattages of the major appliances and then determining the electrical wiring required in the house. A practicing nurse reads and understands charts, temperature, and blood pressure readings.

The pre-algebra course should be equivalent to the 1st half of the first year algebra. Its purpose is to address simple arithmetic through a study of polynomials. An emphasis on "hands-on" and "real-world" applications should be included. The first goal is to provide a solid foundation for continued study in algebra. The second goal is to help students realize that algebra and related mathematical skills are important in attaining success for their future goals.

To accomplish the first goal a thorough review of arithmetic and basic algebraic concepts will be done. These topics will be discussed and practiced until a good understanding is exhibited. The second goal will be met by repeated integration of "hands on" or "real-world" examples of related mathematical topics. Each topic is related to use outside the classroom in both jobs and careers. The use of computers and calculators enhances the technological background of each student and also enhances their understanding of mathematical concepts.

In order to meet the needs of the students and a changing society the following competencies should be met upon completing a pre-algebra course:

Students will

1. perform, with calculators, arithmetic computations using proper order of operations for positive and negative integers, fractions, decimals, and percents.
2. use estimation to anticipate results, check results, and approximate.
3. work effectively with team members to obtain and use measurements (cooperative learning groups.

4. utilize rules of precision and accuracy when working with measured data.
5. utilize data obtained from reading uniform and non-uniform meters and gauges.
6. compare and contrast various systems of measurement found in technology such as U.S. customary, apothecary, metric, and household.
7. convert units between and within systems of measurement.
8. convert measurements between standard and scientific notation and calculate using scientific notation.
9. represent technical situations involving variable quantities with expressions, inequalities and matrices.
10. model real-world phenomena using functions and recognize many problem situations that can be modeled by the same type of function.
11. solve single variable equations and inequalities to find missing information.
12. select appropriate formulas to serve as a problem solving catalyst.

ALGEBRA I

A. PREREQUISITES: 8th grade competencies

B. GENERAL OUTCOMES:

1. Perform, with calculators, arithmetic computations using proper order of operations for positive and negative, integers, fractions, decimals, and percents.
2. Solve single variable equations and inequalities to find missing information.
3. Graph linear and non-linear functions and inequalities to find missing information status and trends.
4. Represent technical situations involving variable quantities with expressions, equations, inequalities, and matrices.
5. Model real-world phenomena using functions and recognize that many problem situations can be modeled by the same type of function.
6. Select & utilize appropriate formulas to serve as a problem-solving catalyst.
7. Apply the rules of powers and roots to solve technical problems.
8. Construct ratios, solve proportions, and recognize and apply the principles of direct and inverse variation found in technology.
9. Define functions and/or inequalities from a graph in order to obtain specific data and analyze alternatives.
10. Solve systems of equations to aid in decision making.
11. Develop oral and written communications of problem solving.

C. METHOD / APPROACH: Hands-on experiences and discovery approach for learning. Technology assisted instruction and cooperative learning.

D. CLUSTER SPECIFIC PROBLEMS OR SITUATIONS MIGHT BE INCLUDED IN THE INSTRUCTION: The owner of a day care center has overhead expenses, an average cost for each child, and the need to find the anticipated cost per child. Find the minimum just to meet the cost of running the business.

APPLIED BIOLOGY

This course is specifically designed to reach the middle 50% students who are not targeted towards a college preparatory curriculum. This course is designed for incoming freshman who have successfully completed eighth grade competencies. The course will cover the fundamental high school biology concepts in a format that is easy to understand and comprehend. The text applies the study of biology to the everyday world there by making it real, relevant, and exciting. The approach of the text places special emphasis on the fundamental unity and diversity of life forms and processes.

In order to meet the needs of the students and a changing society the following competencies should be met upon completing an applied biology course. Students will have to clearly understand that both plant and animal life depend on systems that maintain and control regulated functions with humans as a major example. A general discussion on the kinds of life, kingdoms, body systems maintaining life, body systems controlling life, plant systems and functions, reproductive and development, traits of living things, and relationships in the environment will be explored.

A. PREREQUISITES:
1. Must be knowledgeable of the five kingdoms of living things
2. Must have knowledge of SI units of measurements.
3. Must be knowledgeable of the scientific method of problem solving and the steps required for solving problems in the lab.
4. must have successfully completed 8th grade science.

B. GENERAL OUTCOME : To be able to successfully complete the course, students will have to clearly understand that both plant and animal life depend on systems that maintain and control regulated functions. Students will know
1. the kinds of life.
2. organizational groups within the kingdoms.
3. systems of the body and systems that control life.
4. compare systems of different animals.
5. plant systems and functions.
6. reproduction and development.
7. traits of living things.
8. relationships in the environment.

C. METHOD / APPROACH: Methods employed in the course will include cooperative learning, concept development, guided practice, independent practice, skill development in the lab, motivation, and connections that relate to jobs that use biology.

D. CLUSTER SPECIFIC PROBLEMS OR SITUATIONS MIGHT BE INCLUDED IN THE INSTRUCTION:
1. A forest ranger will need to know the types of plant and animal life that inhabit certain environments.
2. An athletic trainer needs to understand how muscle and bone make up the human body.

APPLIED PHYSICAL SCIENCE

A. PREREQUISITES:
1. Students must be able to work in the lab and collect data
2. be familiar with SI units and perform simple conversions
3. pre-algebra enrollment or higher successful completion of 8th grade math
4. must have successfully completed 8th grade science

B. GENERAL OUTCOMES: Students will do the following
1. be able to do more advanced conversion than those done in the middle school.
2. understand and use the properties of matter, atomic structure and compounds.
3. understand elemental properties and how they relate to chemistry and how they affect people
4. list the five types of reactions and understand what affects reactions.
5. understand the importance of acid and base reactions.
6. understand Industrial importance of organic chemistry.
7. understand force work and power.
8. understand motion and sound.
9. understand light and color.
10. understand currents circuits.

C. METHOD / APPROACH: Students will be taught using a variety of methods. Field trips, computers, videos, and speakers will supplement the classroom work and book. An emphasis will be placed on starting with a concrete problem or situation. The students would then work within the unit, and using any previous knowledge, work to construct a viable answer to the problem or situation. Cooperative learning and discovery learning methods will be used extensively.

D. CLUSTER SPECIFIC PROBLEMS OR SITUATIONS MIGHT BE INCLUDED IN THE INSTRUCTION:

1. water quality testing.
2. Force that a building places on a foundation.
3. How acids and bases will affect a manufacturing process or a manufactured product.
4. Understanding the concepts of work, force, and power are essential for sales people buying and selling trucks.
5. Circuits and currents are essential for electricians and engineers.

CHEMISTRY (APPLIED)

A. PREREQUISITES:

1. Measurements -> SI system and basic conversions
2. Basic atomic structure
3. Common elemental knowledge
4. Basic nomenclature & balancing equations
5. Algebra I or higher math
6. Successful completion of 8th grade science program.

B. GENERAL OUTCOMES:

1. Understand the cause and affect of chemical reactions
2. What can effect reactions?
3. Understand acid/base chemistry with the concepts of pH and how it may effect them in their cluster specific problem.
4. Basic concept and nomenclature of organic compounds for use in discussion of industrial and health use.
5. Nuclear science for engineering career exploration and health sciences.
6. Stoichiometry
7. Equilibrium
8. Thermodynamics
9. Discussion of the chemistry in the areas of food science, water, resources; study specifically petroleum industry, health and chemical industry.

C. METHOD / APPROACH: Students will be taught using a variety of methods. Field trips, computers, videos, and speakers will supplement the classroom work and book. An emphasis will be placed on starting with a concrete problem or situation. The students would then work within the unit, and using any previous knowledge, work to construct a viable answer to the problem or situation. Cooperative learning and discovery learning methods will be used extensively

D. CLUSTER SPECIFIC PROBLEMS OR SITUATIONS MIGHT BE INCLUDED IN THE INSTRUCTION:

1. Dyeing clothing is sometimes an acid / base reaction; talk about the pH and types of dyes.
2. Discuss the amount of nuclear fuel needed to provide power for a city.
3. Discuss organic chemistry and how it relates to the health field; DNA finger printing for forensics.
4. Discuss the usefulness of water in engineering, what it is used for in industrial processes, how you might have to help your company decontaminate it.

West Side High School

Tech Prep Clusters:

Industrial Technology and Pre-Engineering

Business

Johnnie Barnes, Ruth Hairston,
John Littman, and Shirley Moorehead

West Side High School Tech Prep Clusters

Group members: Johnnie Barnes, Ruth Hairston, John Littman, Shirley Moorehead

Career Clusters: Industrial Technology and Pre-Engineering Business

OVERVIEW

The West Side High School Tech Prep Program includes the areas of Industrial Technology/Pre-Engineering and Business. The curriculum consists of the existing courses and 1-2 technical courses each year, such as business information, manufacturing technology, and manufacturing materials. It is to be taught through application-based instruction. The program is designed to prepare students for further educational or employment opportunities by providing them with essential academic and technical foundations.

Industrial Technology Cluster

The choices of Tech Prep classes should give enough entry level competencies for students to enter the job market right out of high school. The curriculum followed with reasonable success should meet the requirements to go on to a +2-year program or into a 4 year bachelor's degree program. The alternative choices in the cluster(s) and the curriculum choices and requirements enable the students of all abilities to reach competency. The cluster(s) should cover the competencies tested by the Gateway Exam. These competencies will have also been covered in previous year's curriculum.

Success of this cluster program can be determined by setting up control groups as a means of comparison. Feedback can be obtained from graduates of the cluster program. Insure that the program is sold and the progress of participants is monitored.

Business Cluster

This cluster will provide the essential skills and practical experiences for some related occupations. It will provide the skills and proficiencies to proceed to a technical program or associate degree. It will provide articulation to a 4-year bachelor's degree program.

This cluster and curriculum provides elective courses that can be geared to the student's ability, aptitude or career goal. It will provide applications and develop links between process and communication skills. The cluster will employ critical thinking, problem solving and science skills. The cluster hopefully will meet the requirements of the Indiana Core 40 competencies.

The success of this cluster program can be determined through evaluations conducted with a control group and the Tech Prep group. Long range studies will be done. An assessment of statistical treatment will be used annually.

POST-SECONDARY + 2 ADVANCEMENT

IVY TECH, DAVENPORT COLLEGE, DEVRY INSTITUTE OF TECHNOLOGY

POST-SECONDARY + 4 ADVANCEMENT

CALUMET COLLEGE, INDIANA UNIVERSITY, PURDUE UNIVERSITY, BALL STATE UNIVERSITY
IUPUI, WABASH COLLEGE, INDIANA STATE UNIVERSITY, ILLINOIS STATE UNIVERSITY
TUSKEGEE UNIVERSITY, UNIVERSITY OF CHICAGO, HOWARD UNIVERSITY, HAMPTON UNIVERSITY

SUGGESTED CAREERS

ENGINEERING
BIOTECHNOLOGY
ACCOUNTING
BANKING AND FINANCE
SCIENCE and MATH EDUCATION
MEDICINE
SANITATION
COMPUTER SPECIALIST
SPACE SCIENCE
BUSINESS ADMINISTRATION
INDUSTRIAL AND MANUFACTURING
SUPERVISOR
MILLWRIGHT
HEAVY EQUIPMENT OPERATOR
INDUSTRIAL MECHANIC
BIOTECHNOLOGY LAB. ASST.
MATERIALS ENGINEERING TECHNOLOGY
ENVIRONMENTAL TECH. INDUS.

CURRICULUM OUTLINE

INDUSTRIAL TECHNOLOGY/PRE-ENGINEERING/BUSINESS

9th Grade

426	English I
528T	Algebra I or 522T - Pre-Algebra
513T	MAPS
563T	Biology I
659T	Keyboarding (Sem)
669T	Computer Applications (Sem)
900	P. E.
748T	Intro. Manufacturing Technology (Sem)
749T	Manufacturing Materials (Sem)

10th Grade

429	English II
534	Geometry or 528 Algebra I
578T	Chemistry
914	Health and Safety (Sem)
452	Speech (Sem)
480	World Civilization

11th Grade

432	English III
537	Algebra II or 534 - Geometry
587T	Physics I
489	U.S. History
669T	Computer Applications
	Elective

12th Grade

435	English IV
496	Government (Sem)
497	Economics (Sem)
881T	Prod. Man. Systems (Sem)
882T	Man. Enterprise (Sem)
766T	Entrepreneurship (Sem)
682T	Business Communications (Sem)
	Elective

Recommended Cluster Electives

Physical Science	Music
Language: French/ Spanish/Japanese	Math
Art	Photography
Consumer Homemaking	Business

EIGHTH GRADE PREREQUISITES

Eighth grade math prerequisites for all students entering the Industrial Technology Pre-Engineering and the Business clusters will be the same. Each student should have successfully completed the eighth grade curriculum with at least a "C" average and should have competencies in measurement involving conversions between customary and metric units; use estimation and approximation to answer questions on given data; perform the four arithmetic operations of

addition, subtraction, multiplication, and division, with integers, fractions, and decimals. Students leaving the eighth grade should be able to solve one and two step equations, and have experienced using percents, ratios, and proportions to solve problems.

Eighth grade science prerequisites for students entering the two career clusters should be the same as the other major areas of sequential studies. Students should have successfully completed the eighth grade curriculum with at least a "C" average. They should have a basic understanding of the human body anatomy and physiology at the cellular level. They should be familiar with the scientific method and its applications. Students should be able to organize data in table and graphs. They should have a working knowledge of the international system of measurement and how to make conversions from the English system.

COURSE DESCRIPTIONS

MAPS

Description: Mathematics Achievement through Problem Solving is a curriculum designed for students assigned to general math. This curriculum emphasize problem-solving, techniques, organizing, representing, and interpreting data, estimation, approximation and using the calculator and computer. These are skills that the student will encounter in real life and the work world.

Students in this class are students who are not ready to take algebra. These students should already be familiar with the calculator and computer, even if only at the very elementary level. The methodology used will include cooperative groups and problem-solving skills, computer aided instruction, and applications-based instruction.

Competencies: Students will

1. use problem-solving skills to demonstrate strategies in solving problems.
2. cooperate with and communicate mathematical ideas to others to form group solutions.
3. use a variety of computational estimation strategies.
4. learn fundamental commands for the computer to use as a tool for problem solving.
5. interpret and use probability statements to predict results for given data.
6. collect, organize, display, and interpret data.
7. select and use the appropriate formula for finding area and perimeter of regular and irregular shapes.
8. solve simple one step equations in one variable.

PRE-ALGEBRA

Description: The students enrolled in this course passed 8th grade math but would benefit from a two year class in algebra skills. These students have been successful in performing the basic arithmetic operations with or without the aid of a calculator, and have had some experience with the computer. The prerequisite skills are the same as for the other 9th grade math classes.

This course will make use of methodologies using cooperative learning skills, small group instruction and projects, computer aided instruction, application based instruction, and interdisciplinary activities.

Competencies: Students will

1. use correct order of operations to simplify numerical expressions and to evaluate algebraic expressions.
2. solve equations with one or more operations using algebraic concepts.
3. solve problems using the four arithmetic operations with positive and negative integers, fractions, and decimals.
4. choose the most efficient method of computation to solve a problem.

5. compare and convert units of measure from one system to another and within a given system.
6. calculate using units of measure or scientific notation.
7. create and solve algebraic equations from real life situations or applications.
8. Solve practical application problems using ratios and proportions to determine or predict results.
9. use estimation and approximation in problem solving.
10. read and design graphs to analyze data.
11. solve problems using percent or one of the three types of percent problems.
12. define and use mean, median, mode, range, and a frequency table to organize and analyze data.
13. use formulas to find area and perimeter, circumference and volume of geometric figures and in applications.
14. solve problems by identifying patterns.

ALGEBRA I

Description: This class will receive students who have completed eighth grade math with a grade of C or better. Students should have already experienced the types of methodology which will be used, such as small groups independent projects, computer aided instruction, application based instruction and interdisciplinary instruction. The curriculum will be that of a regular algebra class with added emphasis on applications to the technology and business clusters. A unit on statistics and probability will be included in the curriculum.

Competencies: The student will:

1. use order of operations, and properties of numbers to simplify numerical expressions or to evaluate algebraic experiences.
2. compute in the four arithmetic operations with positive and negative integers.
3. solve first degree equations using algebraic techniques.
4. solve word problems or real world situations by translating the problem into equations, expressions, or inequalities.
5. solve and graph inequalities.
6. solve quadratic equations by methods of factoring, completing the square, and quadratic formula.
7. use and simplify rational expressions.
8. compute using rational expressions.
9. use given information to find directed distance or slope of a line.
10. express algebraic fractions in simplest form.
11. solve problems with ratios and proportions.
12. solve problems involving fractional equations.
13. solve problems in real life situations which involve mixture, work, distance problems and motion problems.
14. solve problems involving percents.
15. use negative and zero exponents in problem situations.
16. use and write numbers written in scientific notation.
17. graph and solve linear equations in two variables.
18. write and graph the equations of a line given two points, the slope, the y-intercept or the equation.
19. define a function by using tables, graphs, or equations.
20. use direct and inverse variation to solve problems.
21. specify the probability that an event will occur.
22. recognize and analyze frequency distributions.

Geometry

Prerequisite: Algebra

Description: Students enrolled in geometry should be able to solve linear equations using algebraic techniques, solve quadratic equations by factoring or using the quadratic formula, and select and use the appropriate formula for finding area, perimeter, circumference, and volume of regular shapes. Students should be able to simplify ratios and use proportions to solve problems. Students should also be able to convert from one system of measure to another and within a given system. This is a regular geometry course which will use problem solving with proofs. Methods of teaching will include cooperative learning groups, group and individual projects, demonstration, application based instruction, and problem solving strategies.

Competencies: The student will

1. define, recognize, and use the basic symbols and definitions.
2. recognize and use the basic properties of two dimensional figures.
3. recognize the hypothesis, conclusion and converse of a conditional statement.
4. use algebraic properties, properties of angles, angle pairs, perpendicular and parallel lines in technical situations.
5. select and use the appropriate formula to find length, area, perimeter, circumference, and volume.
6. state and apply the Triangle Sum and Exterior Angle Sum Theorems for a triangle.
7. list the properties of a parallelogram, name and list the properties of the special parallelograms.
8. name the common convex polygons and common regular polygons.
9. find the measures of the interior and exterior angles of a convex polygon when given the number of sides.
10. use similarity, ratio, and proportions in indirect measurement and in scale drawings.
11. simplify radical expressions, and determine the geometric mean between two numbers.
12. identify and list the properties of the special right triangles.
13. use the Pythagorean Theorem and right triangle trigonometry to determine angle measures and lengths.
14. identify and define a circle and a sphere, and the lines, line segments, and angles associated with both.
15. use the compass and straight edge to do simple basic constructions and use the ruler and protractor to check such constructions.

ALGEBRA II

Prerequisites: Algebra I, Geometry

Description: Students enrolling in Algebra II should have taken a year's course in geometry and successfully completed it. This course, however, could be taken immediately after first year algebra course. The course covers all of the fundamental concepts of algebra ordinarily studied, and the concepts of trigonometry as well. The course begins with a review of some basic concepts necessary for a second year of algebra, operations with integers and their properties, linear equations and inequalities, absolute value, and equations in problem solving. Instructional methodologies will incorporate cooperative learning groups, applications from the clusters, lecture, and individual assignments.

Competencies: The student will

1. solve and graph linear equations and inequalities in one variable.
2. solve number relations, consecutive integer, perimeter, and age problems.
3. use formulas to solve work problems.
4. solve world problems involving mixtures of items or objects in motion.
5. solve and graph quadratic equations and inequalities by factoring.

6. simplify complex rational expressions.
7. solve motion problems.
8. solve quadratic equations by completing the square, and factoring, and the quadratic formula.
9. study the nature of solutions of a quadratic equation by examining the discriminant of the quadratic formula.
10. graph linear equations in two variables by using ordered pairs, slope and y-intercept.
11. use the slope, midpoint, and distance formulas to write the equations of lines.
12. find and evaluate determinants of 2x2x3 matrices.
13. use determinants to solve systems of equations.
14. determine the domain and range of a relation or function.
15. solve problems using direct, inverse, joint, and combined variation.
16. find a specified term and write several consecutive terms of a given arithmetic or geometric progression.
17. find arithmetic and geometric means.
18. use the binomial theorem to expand binomials.
19. solve problems involving combinations and linear and circular permutations.
20. find the probability or odds of success or failure for an event.
21. use trigonometry of the right triangle to find lengths and angle measures.
22. use the law of sines and the law of cosines.

Trigonometry

Prerequisites: Algebra II

Description: This course will extend the concepts studied in Algebra II. It may be paired with a course in Probability and Statistics. This course could be used as an elective. Students should come with prerequisite skills attained in Algebra II. More applications for the technical clusters should be used in this course. Teaching methodologies will include cooperative learning groups, applications, and aided instructions.

Competencies: The student will

1. define and apply the trigonometric functions in a variety of problem solving situations.
2. given appropriate data, solve right triangle problems.
3. graph the trigonometric functions in a Cartesian plane graph.
4. solve trigonometric equations and circular function equations.
5. given appropriate data, use the Law of Sines and the Law of Cosines to solve problem.
6. solve problems of navigation and /or force by applying vector concepts.
7. fully explore and use the scientific calculator to solve a variety of problems.
8. use a computer to prepare computer programs to develop algorithms for solving problems related to the technical or business world.
9. determine the probability of an event for a given sample of data, and calculate the number of permutations of any number of objects.
10. calculate the probability of an event by using permutations and combinations.
11. interpret line graphs, bar graphs, and picture graphs, including abridged versions of each.
12. describe and calculate the meaning of the various measures of central tendency (i.e., mode, median, midrange, or mean) and the meaning of the various measures of dispersion (i.e., range, variances, or standard deviation).

Biology

Prerequisite: Basic Human Physiology.

Description: The course is designed to meet the needs of the average student who wishes to pursue a career in the areas of health, industrial technology, or business. Core subject material to be

taught will include but may not be limited to micro-organisms, continuity of fife, Water, natural resources, disease and wellness.

Students will be evaluated on the basis of their performances on various activities which will measure their competency skills in the following areas: oral communication, written communication, creative thinking, problem solving, decision making, measurement skills, calculation skills, research skills, deductive skills, presentation skills, scientific process skills, group work skills, computer skills, and the ability to read graphs, charts, and schematic diagrams.

Competencies: The student will

Microorganisms.

1. relate the basic characteristics of each of the four groups of microorganisms to their ability to survive and reproduce under various conditions.
2. evaluate the contribution of various groups of microorganisms to the cycling of matter and energy through the environment.
3. compare the quality of water, soil, food, air, and the health of plants and animals to the numbers and types of microorganisms present in a given environment.
4. describe the methods by which microorganisms are manipulated to produce better crops, treat diseases, and process waste.
5. evaluate the potential personal, societal, and economic impact of genetically engineered microorganisms.
6. show how metabolic processes in microorganisms are commercially applied.
7. analyze the way disease-causing microorganisms spread, multiply, and cause harm in their hosts.

Continuity of Life.

1. relate the continuation of life to the cell's chemical code, DNA.
2. relate the male and female reproductive systems to their reproductive functions.
3. compare how different methods of birth control prevent pregnancy.
4. predict the special needs of the expectant mother and the developing fetus during different stages of pregnancy and birth.
5. explain what animal breeders need to know about genetic inheritance in animals to produce more economically valuable breeds.
6. compare the results of natural selection in the wild population to the results of artificial selection in similar domesticated species.
7. predict how genetic engineering might affect society during your lifetime.

Water

1. evaluate the effect of different water uses on water quality and water quantity.
2. analyze the role of water in maintaining life: as a transporter of nutrients, biochemical reactions, in maintaining water balance, and in regulating temperature.
3. express the concentration of solutes in a solvent appropriately according to the occupational context.
4. carry out titration procedures such as might be used in an occupational setting.
5. analyze neutralization reactions involving buffer solutions such as those that might be carried out in an industrial setting.
6. interpret pH reading and use the pH scale as an indicator of water's acidity or alkalinity.
7. explain tests to determine water quality, including pH, biochemical oxygen demand, total solids, and concentrations of various solutes in water.
8. link water-treatment methods to different types of wastewater contamination that treatment is intended to address.
9. suggest several different methods to prevent water pollution during personal or domestic use of water and handling of wastes.

Natural Resources.

1. decide whether or not a natural resource will be available in the future.
2. give examples of how natural resources are used to produce energy, make products, provide food and shelter, and improve the quality of life.
3. analyze problems that result from obtaining and using natural resources.
4. propose solutions to problems resulting from obtaining and using natural resources.
5. relate jobs to natural resources.

Disease and Wellness.

1. report on some major health threats and leading causes of diseases in the United States.
2. recommend methods of disease prevention and control according to what is known about how diseases originate.
3. analyze how the body defends itself against disease.
4. compare and contrast bacterial and viral infections, their treatment, and prevention.
5. evaluate facts and beliefs about different types of abused chemicals and their effects on the body.
6. prepare a plan for reducing your health risks and improving or maintaining your health.
7. appraise health-care careers according to these criteria: the role performed (prevention, control, diagnosis, care and treatment, and support); level (entry, technical, and professional); and requirements for employment.

CHEMISTRY FOR TECHNOLOGY

Prerequisites: Algebra, Biology

Description: This is a two semester course which covers the same general content as the existing Chemistry I with particular emphasis on the areas of chemistry which directly affect the industrial and pre-engineering technologies. Topics included are: nuclear, organic, and acid base chemistry, the atom and electron and chemical bonding, thermodynamics, calculations involving reactions and the atmosphere and natural waters.

The methods will include oral and written communication, calculations, problem solving, science process skills, cooperative learning in lab groups, and interpreting diagrams.

Competencies: Students will

1. identify and demonstrate the use of laboratory equipment and instrumentation.
2. determine significant digits for metric measurements.
3. describe molecular structure.
4. convert amounts given in grams, moles, and molecules.
5. demonstrate proficiency in the gas laws and stoichiometry by calculating pressure of gases.
6. interpret solubility graphs and describe the relationships.
7. write equilibrium expressions for a given chemical reaction.
8. determine the hydronium and hydroxide ion concentration of an acid or a base given the molarity.
9. describe the environmental concerns of the atmosphere and natural waters and use the appropriate instrumentation.
10. describe at least three ways in which a mixture may be separated.
11. state evidence that determines whether a substance isan element, a compound, or mixture.
12. when given the name of an element list its symbol and vice versa.
13. describe the basic atomic theories proposed by Dalton, Thompson, Rutherford, and Bohr.
14. define/determine atomic number, mass number, protons, neutrons, electrons, and isotopes.
15. identify the properties common to the classes of compounds known as acids and bases.
16. identify at least two common uses for hydrochloric acid, sulfuric acids, and sodium hydroxide.

17. describe the importance of the periodic table.
18. determine the location of families on the periodic table.
19. describe how a chemical bond is formed.
20. distinguish between covalent, polar covalent, and ionic bonding.
21. apply the octet rule to describe molecular structure.
22. find the mass of one mole of a substance when given the formula for an element or compound.

PROBLEM SITUATIONS

MATH

1. Using information obtained from several lending institutions, determine the best method to use to finance the purchase of an automobile.
2. Select a vacation destination and determine how far away the city is from where you are, the cost of spending a specified number of days in a hotel/motel, estimate the amount of money to be spent for food, souvenirs, and gas.
3. Determine the cost of remodeling a room by painting the walls and tiling the floor. Give a complete breakdown on the cost of the entire job, including labor. Estimate the number of days to complete the job.
4. Find out why it was important for the Egyptians to learn how to use coordinates to survey the land.
5. Write a paragraph that describes three similarities and three differences between a map and a coordinate plane.
6. Conduct a survey on the average length of time students watched television last week. Organize, record, and present the data.
7. Using a blueprint of a new home, discuss the scale used on the blueprint and determine the actual measurements of the full-size object.
8. Collect, analyze, interpret and present statistics gathered from a month of basketball games played by the school's team.
9. Determine the best buy for two different sizes of pizza by contacting several pizza companies.
10. Given an object, determine its volume, surface area, and design a package to contain the object.
11. A person's federal income tax and state tax are in the ratio of 10 to 3. Determine how much state tax is paid, if federal taxes are $8,666.67.
12. Rental cost for a machine is $50 plus $15 per hour of operation. Determine how many hours this machine can be operated to stay under $200 in total cost.
13. A hard-cover book sells for $16.50. The same title in paperback sells for $4.95. Determine how many hard-cover books a dealer must sell to take in as much money as she does for 40 paperback copies.
14. A police helicopter clocked a truck over a stretch of highway 1/5 mi long. The truck traveled the distance in 10 seconds. Determine the rate the truck traveled. Convert this to mi/h.
15. A bottle company bought three machines to cap the bottles. Machine A caps twice as many bottles as Machine B. Machine C caps 500 more bottles than Machine A. The three machines can cap a total of 40,000. Determine how many each machine can cap.
16. The distance between the lens and the negative is 2 inches. Determine how far away from the lens must a photographer place the photo paper if the developed picture is to be 5 times as large as the negative.
17. Presto Printing makes cards which, when opened, are similar to when they are folded. Determine the width of the card for the given dimensions of lengths 4 cm. and 8 cm. opened.
18. A zoologist measured the length of a side of a natural beehive as 8.0 mm but forgot to measure the height of each cell. Approximate the height to the nearest 0.1 mm. (beehive was a regular hexagon).

19. A ladder is safe if the angle it makes with the ground is 80 degrees or less. Determine how far up on a vertical wall a 30-foot ladder can reach and how far it should be placed from the base of the wall.
20. Determine the rise of a wheelchair ramp if the slope of the ramp is 1/12 and the bottom of the ramp is 10 ft. from the base. If national wheelchair guidelines dictate handrails for a rise greater than 6 in, should this ramp have handrails?
21. Construction engineers know that the strength of a column is proportional to the area of its cross section. Determine which of two columns can support more per pound of column material, if the larger of two similar columns is 3 times as high as the smaller.
22. Determine the area, to nearest 1000 sq. m of a piece of land that is irrigated by a circular water system that has a moving arm 430 m. long.
23. Determine, in millimeters, the mean, range, and variance for a sample of a butterfly species if their mean length is 1.76 in. with a range of 3.02 in., and a standard deviation of 0.53 in.
24. Consider a 10% discount function $D(x)=0.9x$ and a 5% total-with-tax function $T(x)=1.05x$, determine the cost after the discount and tax for an item with a list price of x dollars.
25. Determine how much an investment of $500 in an account paying 6.25% annually will yield if left untouched for 3 years. Use the function: $A(t)=P(1+y)t$

SCIENCE WORKPLACE EXAMPLES

1. An agriculture specialist monitors the pH of soil.
2. A wastewater treatment technician monitors the process by checking the pH of water samples drawn from various places at the treatment and adjust flow rate when needed.
3. A technician for a swimming pool company compares pool water samples to color charts to determine the amount of chlorine present.
4. A lab technician calibrates and adjusts the gas chromatography before introducing the samples to be analyzed.
5. A municipal wastewater treatment lab technician takes charge of all chemical storage, mixing, handling, and disposal.
6. A patient care technician weighs, checks temperature and blood of incoming patient.
7. A pharmacy technician reads a doctor's prescription and enters it into the computer to make a record and label.
8. A pharmacy technician combines (mixes powders, emulsions, solutions, etc.) according to standard procedure used in pharmacy.
9. A physical therapy assistant uses tables and charts to record and interpret patient data.
10. A plant nursery/soil farming operator monitors compost under development for carbon/ nitrogen ratio, temperature, blend, moisture, resistance to compaction.
11. A plant nursery/soil farming operations assistant blends finished compost with soil and sand to make mixtures suitable for different types of plants and landscaping.
12. A public health technician (a) interprets or analyzes data and (b) produces reports of data, including graphs and charts.
13. A food production manager understands how various ways of processing foods-cooking, freezing, etc. - affect their flavor, nutrional content, texture, as well as the growth of microorganisms.
14. An environmental analysis technician checks the air emissions for opacity. (Should be under 30%).

William A. Wirt

and

Andrean High Schools

Tech Prep Clusters:

Business

Health

Manufacturing and Engineering Technology

Gene Giorgio, Patricia Toney, Mazen Al-Hajar,
Ada Crosby, Judy Tonk, and Paul Bohney

Wirt High School

Andrean High School

Group members: Wirt High School: Patricia Toney, Mazen Al-Hajar, Ada Crosby, Judy Tonk
Gary Community Schools: Paul Bohney
Andrean High School: Gene Giorgio

INTRODUCTION

The Tech Prep (Technical Preparation) program is a course of study designed to meet the need for the high school graduate to have a more technical oriented educational back-ground. The target group of the Tech Prep program is high school students who may not pursue professional careers or attend four-year colleges or universities, but who could benefit from additional education at a two-year post secondary program. Through a blending of higher level academic and vocational courses, Tech Prep prepares students for the advanced courses required by two-year programs and for employment at entry level positions. Although a Tech Prep program is designed to ensure high school graduates a smooth transition into technical two-year programs, no student is "locked in" to Tech Prep or to attending a two-year program. A Tech Prep course of study is only a guideline that ensures students proper preparation to meet either the demands of technical schools or today's technical job markets.

Career Clusters: Business
Health
Manufacturing and Engineering Technology

We proposed three clusters, however we only had time to consider the Business Cluster. A student completing this four year Tech Prep sequence in business will be able to gain immediate employment because of the practical and technological business skills that he/she has gained through the courses. As long as the student chooses the electives carefully he/she will be able to enter immediately into a post-secondary school to complete a technical or associate degree. Also with the correct electives in the Tech Prep program, the student will be able to enter into a bachelor's program upon completion of the associate degree.

This cluster and curriculum responds to reasonable differences among students who may be pursuing competency in the business cluster because different learning styles will be addressed to the extent possible through hands-on, cooperative learning, peer tutoring, professional tutoring, problem solving, student research projects, etc. They will prepare the students for the Gateway Exam because the curriculum content will be aligned to the competency proficiencies on the state level.

The Curriculum will meet Core 40 competencies as long as proper electives are chosen for the 11th and 12th grades. The student four year plan should be reviewed in the 10th grade to allow for changes. We can determine the success of this Business Cluster with follow up research with interviews of employers and employees.

PROPOSED CURRICULUM OUTLINE: BUSINESS CLUSTER

EIGHTH GRADE

The students entering the Tech Prep program in the ninth grade should come prepared with a working knowledge in these classes:
8th Grade Mathematics
8th Grade Language Arts
Indiana History
Introduction to Life, Physical, and Earth Sciences

NINTH GRADE

Integrated Math I (for the student who can show proficiency in 8th Grade mathematics) or Mathematical Problem Solving (for the student who needs some time and practice with 8th Grade Math concepts and problem solving)
Biology
English I
Keyboarding / Business Computer Applications (one semester each)
Introduction to Business
Physical Education

TENTH GRADE

Integrated Math II or Integrated Math I
Keyboarding II / Business Computer Applications II (one semester each)
Physical Science
English II
Geography / African-American History (one semester each)
Health & Safety / Speech (one semester each)

ELEVENTH GRADE

Integrated Math III or Integrated Math II
Science Elective
English III
U.S. History
2 Business Tech Electives

TWELFTH GRADE

Math Elective
Science Elective
English IV
Government / Economics (one semester each)
2 Business Tech Electives

BUSINESS TECH ELECTIVES

Accounting I
Accounting II
Business Law (one semester)
Entrepreneurship (one semester)
Production Typing
Business Communications
Career Center Program

COURSE DESCRIPTIONS

INTEGRATED MATHEMATICS I

Course Description: This is the first year of a three-year sequence covering the essential topics of Algebra I, Geometry and Algebra II. Some topics of logic, statistics, and discrete mathematics will also be included.

A. Prerequisites: The students to be successful in this class should have knowledge of whole numbers, integers, rational numbers, decimals, number theory, ratio and proportion, percents and square roots.

B. Outcomes:
1. Mathematical Communications: Students are given opportunities to use tables, diagrams, and concept maps to recognize and describe patterns and to further investigate congruence and symmetry and evaluate expressions.
2. Measurement and Equation Solving: Students estimate lengths and distances, use scientific notation and solve equations by balancing and inverse operations.
3. Introduction to Data Analysis: Students construct, read, and interpret histograms, stem and leaf plots, and box-and-whiskers. They also learn how to use measure of central tendencies.
4. Problem Solving: Students learn to solve formulas for certain variables and use equations to solve problems.
5. Coordinate System and Functions: Students learn about coordinate geometry and introduction to functions.
6. Proportions: Students use proportions to predict events and solve problems involving similar polygons and right triangle trigonometry.
7. Direct Variation: Students learn about slopes and dimensional analysis.
8. Linear Equations: Students learn to solve systems of equations and use them in real world applications.
9. Finding Volumes: Students work with prisms, pyramids, and cylinders.
10. Quadratic Equations: Students learn to work with parabolas and investigate models by the quadratic formula.

C. Method/Approach: This course will use many methods all with the purpose of getting the students involved in the self-learning of the concepts. We will employ the use of

manipulatives	application based lessons
problem solving	cooperative learning
peer tutoring	technology use
computer aided practice	student math projects
knowing how to learn	knowing how to listen
field trips to appropriate businesses	

D. Cluster specific problems that we might encounter are to be minimal because the competencies will be broad enough to fulfill the requirements for all the clusters. The use of community business resources and the use of a business advisory group will guide the curriculum of the cluster.

BIOLOGY

A. Pre-requisites: The students should have basic knowledge of scientific terminology, science process skills, and the use of the metric system.

B. Outcomes: All students at the end of this course should be able to
1. apply science process skills to conduct investigations.
2. read and interpret graphs, flowcharts, and schematic diagrams to acquire needed information.
3. identify and demonstrate proper use and care of basic laboratory tools and instruments.
4. demonstrate the use of a microcomputer or calculator to assist in data collection and analysis.
5. perform safe laboratory procedures and work responsibly as a member of a project team.
6. demonstrate integrity and ethics in conducting investigations.
7. evaluate the effect of technological advances on the environment.
8. practice least obtrusive techniques in observing; analyze and solve problems based on knowledge of science, technology, society, and environment.

C. Methods/Approaches:
hands-on activities
critical thinking and problem solving
cooperative learning, peer tutoring, and team work
computers
labs
science projects
technical lab report writing
oral communication
personal and career development
knowing how to learn

D. Cluster Specific Problems:
The above goals and objectives are broad enough to be utilized in all three of our clusters (Business, Health, Manufacturing /Engineering Technology). The use of community resources will monitor the process of the students.

MATHEMATICAL PROBLEM SOLVING

A. Prerequisites: An understanding of addition, multiplication, subtraction, and division. This course is open to any student who has completed 8th grade.

B. Outcomes: At the end of this course the students will be able to:
1. recognize number patterns.
2. use tables to solve problems.
3. use graphs to solve problems.
4. use equations to solve problems.
5. use the "Guess and Check" method to solve problems.
6. make the problem simpler.
7. draw diagrams that illustrate the problems.
8. use an appropriate formula.
9. list all the possible solutions.
10. collect pertinent data.

11. estimate an answer when necessary.
12. use appropriate technology.
13. use functions.
14. know order of operations.
15. make a model.

C. Methods/Approaches:
1. Guest speakers
2. Group projects
3. Cooperative learning
4. Learning to listen
5. Unit on using the calculator productively
6. Doing the same problem by three or more methods
7. Open-ended questions
8. Unit on variables and algebraic expressions
9. Using the newspaper

D. Cluster Specific Problems
1. Banking: Constructing and using interest tables
2. Budget: Buying equipment
3. Taxes: Using tables and formulas
4. Purchasing
5. Computing wages